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Antique Art in American Schools.

FROM a small pamphlet which has been sent to us, printed in New York for the American Social Science Association, as well as from accounts previously before us, it appears that a move has been made in the States in regard to what may be called the educational apparatus of schools, which might very well be followed, as it ought indeed to have been inaugurated, in this country. The pamphlet in question is a list of the subjects and prices of casts from the antique, purchased for the decoration of the principal room or meeting-hall of the Girls' "High and Normal" School, West Newton-street, Boston, with a short description of the subject of each work, notes as to where they were obtained, and the cost of exportation; and a few preliminary remarks explaining the reasons which led to the experiment.

The plan of decorating one or more rooms in public school-houses with a collection of casts was laid before the Educational Committee of the American Social Science Association, by one of their number, about two years ago. "Casts, if selected to express the highest laws of form and the purest types of beauty, were thought to promise a favourable effect upon the mental and moral training of the young, especially if associated with their studies,—that is, their daily efforts to improve themselves." A special committee was subsequently formed to carry this design into execution; and they decided to make their first experiment by placing a number of well-chosen casts in the new school above referred to, which was in course of erection, as they considered that a school for the higher education of girls "comprised just that body of teachers and pupils with whom the experiment might most favourably be tried," and they were assured also of every co-operation and assistance on the part of the school committee and their architect. The large room, which was to form the place for "general gatherings and exhibitions of the pupils," was accordingly finished at the expense of the city, with special reference to the casts. In this point the special committee at Boston showed a perception of the fitness of things beyond that exhibited by the London Royal Academy in a similar case, as this latter body have built a room for the works of Gibson, without any "special reference" to the size, shape, or character of the works to be placed in it. In the Boston school-room we are told that, "for a series of slabs from the friese of the Parthenon, an architrave has been constructed, resting on Doric pilasters. Between these pilasters the walls have been painted of a colour suitable as a background, and brackets or pedestals of proper form have been provided for the busts and statues." It is evident that some care has been taken to do the thing properly. The spirit in which the undertaking has been carried out it is also very agreeable to note:—

> "The cost of the casts themselves, their packing, transportation, unpacking, and repairing, has been met by the subscriptions of a few members of the American Social Science Association, together with some persons not members. It has been a quiet movement, begun and ended under the competent direction of one gentleman in particular, whose knowledge of the best casts to be procured and of the best modes of procuring them, has been of inestimable value to the enterprise.
>
> All is now happily accomplished. The casts are in their places, and the work it is hoped they will do has been begun. . . . . The collection has not been made for a single school, or for a single city, but for every school and every town or village where a similar attempt to extend and beautify our educational borders is possible."

The casts include, besides the Parthenon friese already mentioned, one of the caryatides of the Erechtheum, the Diana and Venus of the Louvre, the Vatican Jupiter, and others; twenty-two in all.

Such an attempt to "extend and beautify" the educational borders certainly should not have been left by us, who are so much nearer the centres where means of doing this may be procured, to be inaugurated in an American school-room. We have often been struck by the cold, bare, uninteresting aspect of the interiors of large school-rooms in this country; more particularly perhaps, in the case of schools for the lower orders, of the class which are now under the control mostly of school-boards. The scholars at upper-class schools in this country are, many of them, not without opportunity of familiarising themselves with the works of art of a high class; if not in school time, in home time at all events. It is difficult to institute a comparison between the condition of English and the American schools in this respect, seeing that in American schools "class" is not a distinguishing social element in the problem as with us: and girls in "finishing schools" in and near London (to take the nearest parallel, perhaps to the Girls' High and Normal School at Boston) have their Kensington Museum open to them; though even in schools of this order a closer and more every-day acquaintance with works of art of a high order might be realised with advantage. But the suggestions arising out of the Boston experiment strike us forcibly in reference to the fitting of the great and increasing number of schools which are being built in England under the new system of educational legislation. We heartily wish that the example we have called attention to might be seriously taken up and followed by the authorities who will see or are seeing to the building of new schools in England. One of the greatest obstacles in getting the people at large (the "common people," if we may use an established phrase), to take any interest in or get any enjoyment from the works of art in our public galleries, arises from the fact that their perceptions and sympathies in this direction have never been cultivated when they were young and in process of education; and they consequently find themselves, if their attention is directed to such things later in life, in an entirely new world, which merely puzzles them instead of giving them enjoyment. If children in Board schools were familiarised with some of those works the study of which plays such a large part in forming the ideas of the more educated portion of Europeans, they would certainly be moved a very important step in advance towards that great end of education, the power of finding enjoyment in our own minds instead of being dependent on merely sensuous comforts for making life tolerable. "Happy," said Goethe, "is he who at an early age knows what *art* is"; and surely such an extension of the field of intellectual enjoyment need not be confined to the upper classes, or to the years of manhood and womanhood. On the contrary, there are, perhaps, few things which exert more important influence over the minds of people in after-life than the forms and associations which they have been habituated to in childhood. If possible, children should never see, or be allowed to get to admire, bad and vulgar drawings, prints, or groups of any kind. Let them have around them, in this impressionable time of life, forms which are beautiful and graceful, and they will almost imperceptibly grow up with a leaning towards a refined taste, and thus an important part of education may be constantly and silently performed. We cannot pass over, either, the cheering and enlivening effect which would be produced in our National Schools by the introduction of such decorative adjuncts as have been referred to. On both these grounds, we call the attention of our educational authorities to the example of what has been begun, and will, we hope, be carried further, in America; and trust that the hint will not be thrown away upon them.

It is impossible to refer to the subject without a reflection on the wonderfully enduring power and vitality of Greek art. Since the forms from which these casts are taken were modelled by the Greek sculptor, civilisation after civilisation has risen and fallen, and ideas upon religion, philosophy, art and politics have changed over and over again. Yet here is the great ultra-modern civilisation, in comparison with which we ourselves are in a way "antique," going back to those same enduring types of what is beautiful in human form and action, to forms which came into being in obedience to beliefs and theories that have long since passed away, the origin and even the meaning of which we can now but barely appreciate; yet simply through their intrinsic beauty these forms still hold their place, and become models and teachers for the children of the new world, illustrating forcibly the eternity which has been said to belong to "things of beauty."

THEATRES: THE LAW AND THE LORD CHAMBERLAIN.

WHEN about two thousand one hundred and seventeen years ago fire, playing havoc with Rome, had seized even the Temple of Vesta,—where, piously guarded, was concealed the image upon which the safety of the city depended,—Cecilius Metellus at the risk of his life rushed through the flames and bore away the Palladium; and the Roman people gratefully decreed that the man who had injured an arm and lost his sight in the accomplishment of the heroic act should receive a privilege never before granted to any one: that of being carried to the Senate House in a chariot. The Metellus of our time has probably ventured his existence more often than he is willing to own, but that his hands are still uninjured and his eyes still perfect may be inferred from what he has recorded in several excellent and some recent books.* The best honour we can pay Captain Eyre Shaw is to show that we have digested them, and thus perhaps induce others who have not yet done so to read them carefully; for he has chariots of his own, and the Senate House is one of the last places to which we should wish to see them drawn. Indeed, it is impossible to complete anything like a parallel between the good sense of a High Priest of modern Fire and the heroism of a Chief Pontiff, for the latter by the rule of his religion was not permitted either to look at or touch a corpse or even to visit a house where lay a dead body,—and who shall say how many more human sacrifices must be made ere Parliament find out that rigorous custom, in the planning and putting together of both public and private buildings, scientifically increases the chance of destruction by fire; and that even the law of this country is ranged on the side of the destroyer?

History takes naturally enough a philosophical view of the fires which have consumed great cities. The Rome of Augustus and of Nero rose, each out of its ashes, more magnificent and more populous than before; and there as elsewhere, at different periods of time, the historian of a burned capital usually concludes with the assurance that though numberless persons fell victims to the flames and property of untold value was destroyed, the result was satisfactory to the majority of mankind. It seems, however, to have been an accepted thing that somebody or some section, political or religious, of the community must have wilfully caused the fire. As in the early half of the first century a few of those people vulgarly called "Christians" were impaled, thrown to the dogs, or burned, in the very gardens of Nero, for having fired the Imperial Capital, so in the seventeenth the destruction of London was attributed to others vulgarly called "Papists"; and in the heart of the City a lofty column, "like a tall bully," commemorated the suspicion. But some practical benefits have resulted from these calamities. Both Augustus and Charles enjoined the use of more durable and less inflammable materials in the erection of new buildings. The Roman, however, wiser than the English, Government organised a fire brigade composed of some six hundred slaves commanded by officers who were permitted to wear the robe peculiar to magistrates and to be attended each by two liotors. Thus the fourteen regions of Rome were confided to the care of seven cohorts of firemen; and it is probable that even then the houses of the great were systematically guarded at night. Later in the century Juvenal, in his satire on wealth, describes how

> "The slaves of Licinus a numerous band
> Watch through the night with buckets in their hand,
> While their rich master trembling lies afraid
> Lest fire his ivory, amber, gold, invade."

Little is extant to show that anything more scientific than buckets of water and hatchets were used in the extinguishing of fires by the Romans, although Trajan's architect, Apollodorus, has left the description of a machine consisting of leathern bottles, with pipes attached to them. Nor is there any authentic record of manual engines or special machinery for the purpose until the close of the sixteenth century. After the Fire of London the architects of Louis XIV. were much exercised as to the best means of protecting the French capital in the event of a similar accident; and in 1699 an individual was permitted, by privilege of the king, to keep in repair and working order a certain number of portable pumps. If Paris has not suffered the calamities from fire,* which have attended other, and particularly English, cities, it is due to the monopoly of her quarries and the extensive use of the plaster obtained from them. This fact seems to have become patent to many Englishmen during the latter years of the last century, and the suggestions made by writers of the time that all wooden beams, joists, and rafters ought to be enveloped in plaster is indubitably of French origin. On February 2nd, 1792, at a meeting of the "Associated Architects" it was resolved that the whole club should consider in committee the causes of frequent fires and the best means of preventing the like; for, according to the pages of the *Daily Advertiser* alone, the number of fires in London during the year 1792 was sixty-four, and the number of lives lost was twenty-three; and though the supply of water and of fire-engines was greater than in any Continental city, fires were more frequent and destructive in the English metropolis than anywhere abroad. The report of the committee was printed the following year; and it was therein noted that "the great principle of prevention is to stop the progress and circulation of the air in all parts of a building concealed from the eye." According to the opinion of the "Associated Architects" the free, constant, and uncontrolled passage of air behind the wainscot-linings, between the floors, and in the roofs, and the easy access of fire from story to story through slender horizontal divisions, and up the staircase, are not only causes of fire, but prevent possible extinction after it has penetrated into the usually hidden recesses. Moreover, they advised that "as good party-walls are the means of confining a fire to one house, so other practicable and not expensive means will confine a fire to one room in a house"; and a very excellent paper concluded with a delightfully-innocent assumption, which subsequent and actual experience sadly contradicts, that future evils of the kind might be averted if the opinion of the "Associated Architects" were made public.

Thirty years before that report appeared had occurred the first of the five fires through which the National Opera of France has been burnt out of house and home. After that disaster, a new building was erected upon land presented by the then Duke of Orleans. Opened in 1770, it held 2,500 spectators, and the official description of the building was eminently satisfactory. It said that "safety was one of the points to which scrupulous attention had been directed"; that reservoirs, containing hogsheads of water, were so placed as to be serviceable in case of fire; that the actors' dressing-rooms were fireproof, and that most of the stairs were of stone. On June 8th, 1781, the building was burnt to the ground, the principal victims were the actors, half-undressed in their rooms; and though a glass of water might have effectually prevented the fire at its outbreak, not a drop was in any of the cisterns. But Parisian wit triumphed over the calamity, for modern Athenians signalised the event by wearing a new colour, that of fire, and called the "Fumée d'Opéra." Another building was occupied almost immediately, and this met with a similar fate some seven years after. The Theatre of the Porte St. Martin, the construction of which was begun in August, 1781, and finished within eighty-six days, was then used as the National Opera-house until 1794; and this theatre succumbed to the exceptional excesses of the last civil war. The building, which was the home of French Opera from 1821 to 1873, was burnt down just as the new house on the Boulevard des Capucines was ready for use; and unless Captain Shaw has recently had cause to alter his opinion, M. Garnier's work, according to him, is the model theatre of the world, in respect not only of comfort and convenience, but also of safety.

Neither the precautions adopted nor the results recorded in the case of the Brooklyn conflagration seem to vary from those of the French disaster of 1781. To quote from our young Transatlantic contemporary, the *American Architect*, "the managers of the Brooklyn theatre had not taken care that such appliances as they had should be kept in order, or that their servants should be taught how to use them." Indeed, one of the chiefs of the Fire Department of New York has reported that in the theatres he inspected the apparatus was found generally in a useless condition, that the water-buckets were empty, and the fire-extinguishers out of order. Obviously appliances to put out flame are not of every-day use; and provided that the public eye can see such things as hose coiled up and buckets of water suspended against a wall, the manager's duty is done, and the legislative conscience appeased. Suffice it that in the principal cities of the world thirty-three theatres entirely succumbed to fire during the course of ten years, from 1856 to 1865, inclusive; and that in 1867-8, fifteen theatres were totally destroyed,—the number of those partially attacked, injured, or threatened, not being deemed worthy of notice.

It has been urged that, to express alarm concerning the dangers of a theatre, is to grasp only a small portion of the risk which the inhabitants of a great city necessarily incur; and that gatherings of people in cathedrals, churches, and public halls of all kinds, are equally liable to panic and destruction. Undoubtedly; but it must not be forgotten that at the theatre, the music-hall, and similar places of entertainment, audiences are usually collected after dark. A little smoke which, in the daytime, might attract the notice of a fireman without being perceived by the public is at night a brilliant flame, and in a few minutes one part of a crowd has trampled down another part in the general struggle to escape. Moreover, no church is ever mercilessly crowded from floor to ceiling like some of the London theatres,—a regard for decency being at least the usual accompaniment of devotional exercise. The inherent dread of fire,—greater at night than in the day,—is increased as the hour for visiting such places of resort is postponed later and later, until now carriages may be seen waiting in Covent-garden during even the small hours of the morning. The destruction of the Paris Opera-house, a little less than a hundred years ago, began at half-past eight o'clock in the evening, just after the close of a performance, which had commenced at half-past five in the afternoon. With these dangers of the night the mediæval communities were not familiar; such places of carnal distraction were unknown or discountenanced in the Middle Ages. Then people enjoyed, in periodical feasts of the Church, the show and trappings of religious exercise, or sought at the fair less æsthetic joys; and common prudence dictated the expediency of being within doors at nightfall. During the earlier ages of Christianity amusements were necessarily carried on by daylight. In the time of Pericles the Athenians started at dawn for the scene of tragic woe and of comedy; they enjoyed the former before partaking of what we now call luncheon, and laughed over the latter before separating for home and the evening meal.

In a Greek theatre the arrangement of parts and distribution of seats may be traced in existing ruins; and though it is not likely that the place of each slave was absolutely marked by an incised perpendicular line in the stone wall (as in the Amphitheatre at Nimes), it is certain that at least the chief slaves, who were the clerks and assistants of their owners, visited the theatre. Most of the women who attended were of a class recognised in Athens; and if Greek ladies sometimes accompanied their husbands or fathers, it is believed that they were not present at a comedy, and it is known that their places were apart and distinct from those of the men. The same restriction or equal punctiliousness is not recorded of the Roman fashions. Ovid, in his reflections upon the different places wherein the flame of love may best be kindled, and pretty women most easily softened into tenderness, pronounces for the theatre. Nor can even a prosaic observer fail to perceive here and there, in his London experience, some confirmation of the Roman poet's opinion. In some pits a well-dressed male arm may often be seen encircling a not exaggerated female girdle, and in many galleries similar attentions, but of a more robust nature, are frequent between the sexes. It has been remarked that fewer of the fair sex are to be seen in the cheaper parts of a theatre than was usual a year, or even six months ago; and if that be really the case, so much the better while the seats in the majority of the London houses are permitted to remain in their present order and condition. It may also be suspected that while most of the pieces provided by the metropolitan managers are such as they are, a large leaven of intellect is rarely collected to witness them;

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* "Records of the Late London Fire Engine Establishment" (London: Effingham Wilson). "Fire Surveys; or, a Summary of the Principles to be observed in Estimating the Risk of Buildings" (London: Effingham Wilson). "Fires in Theatres" (London: E. & F. N. Spon). "Fire Protection: a Complete Manual of the Organisation, Machinery, and General Working of the Fire Brigade of London" (London: C. & E. Layton).

* The systematic destruction in 1871 is exceptional: had Somerset House and Northumberland House been fired in a similar manner, the whole of the Strand would probably have succumbed.

so that Swift's jaundiced definition of amusement being "the happiness of those that cannot think" may apply not inappropriately to the average theatre-goer. It behoves, therefore, the thinking portion of the community, if not to devise means for the protection of their less fortunate brethren from possible injury or death, at least to point out the dangers they run in blind pursuit of pleasure. This has been done of late in the columns of the press; but some ten years ago it was done in a remarkable manner by M. Davioud, a Paris architect of great experience, who was deputed by the then Prefect of the Seine to visit this country and draw up a report for official use concerning the structure, superintendence, and state of the London theatres.*

M. Davioud expressed astonishment that the clauses of the Act relating to an English building intended to be nightly filled with spectators were so slight, and compared them to the numerous requirements of Parisian authority. Few, if any, of the new theatres in and around the Strand would have been sanctioned in Paris. That the best way of separating the stage and workshops from the auditory, and the general mode of construction, should be left to the discretion of speculators and the tolerance of district surveyors; that no recognised means of protection from fire or extinction of the same existed; that no police regulations regarding the seating of the public were in force; and, in fact, that all the many details of theatrical management upon which the French law is most stringent were unknown in London, seemed to him incomprehensible. He examined all the theatres, from the public-house annexe to the Opera-house in Covent-garden. The slightness of their cross walls, and the promiscuous use of naked timber in the majority of them, seemed to him eminently dangerous; and he expressed his opinion that if fire broke out in any one in the upper part of the stage, it must rapidly and inevitably spread along the roof, and thus envelop the auditory. Such chances of disaster are lightened in Paris by rules and regulations which are strictly enforced; and the strong solid wall which ought to form a secure barrier between the roof of the auditory and that of the stage is there deemed an important point in theatre-building. He concluded by declaring that in London the *théâtre de luxe* did not exist; nor has there been erected in the course of the last ten years one which can be deemed worthy of the appellation.

Not less emphatic and certainly not less valuable than those of our French colleague, are the expressions of astonishment in which Captain Shaw sparingly indulges. He deems it subject of wonder "how any country, making even the pretence of superintending the care of its inhabitants, can allow the dangerous practice of entering and leaving a theatre by passages through other buildings." He remarks that in at least one Continental country two exits are required for every 300 persons, and three for every 500. He would have every place where a crush is likely to occur, free from steps. He objects to a carpenter's shop exactly over the principal chandelier or a main gas-burner; he would remove from within the theatre to a place separated from it by thick brick walls and double doors, carpentering on a large scale, scenery-making, painting, &c.; and he would prohibit the storage, except in specially protected parts of the building, of timber, clothing, furniture, and the thousand articles known as "property." Lastly, he would divide the stage from the auditory by a brick wall rising above the roof, arched over the proscenium, and fitted in the opening of the stage with a curtain of metal or some material sufficiently uninflammable to resist fire for at least fifteen minutes. He very properly condemns the present mode of building theatres in the metropolis, whereby an external cage of brickwork is made to surround "a mere collection of apparently temporary fittings," and covered by a wooden roof, the recesses of which are loaded with just the very materials to make a fire. The desiccation of this wood, from the intense heat which stagnates under the ceiling, is a matter of course; and this increases the danger of rapid ignition. He endorses, probably without knowing it, the opinion of the "Associated Architects," that a building intended to hold hundreds and tens of hundreds should be constructed on the principle of a fortress, with the intention of resisting an enemy from one post of defence to another; and that even when the outer walls are taken there should still be a tower or a dungeon to which the defenders can retreat. Our modern enemy is fire; and if a theatre, instead of being doomed at one and the first attack—instead, to use a homelier illustration, of all its owner's eggs being put into one basket—were so cut up by brick walls into divisions, the openings of which could be closed at a minute's notice by a fireman on duty, it would be possible to arrest the spread of flame; and if even then the property could not be saved, at least the spectators, actors, and servants would be assisted in their escape by shutting off some from danger or retarding the approach of fire to others. In building a new theatre, or in altering an old one, the first thing to be done is to divide the whole into two parts—Captain Shaw, with professional ardour, says "two distinct risks,"—and the stage, workshops, and stores must form one part, while the auditory forms another. After that it may be found possible with perpendicular brick walls and horizontal concrete ones to divide the workshops from the stage, and the stores from both.

Although quite disposed to accept such dicta as those propounded by the chief of the Fire Brigade,—that a theatre should be isolated from neighbouring buildings; that every inlet should be free from steps; that each portion of the audience should be enabled to leave by different passages, stairs, and doors,—we are bound to admit that enforced compliance with such rules would end in London being deprived of the larger number of its theatres. There is, however, one excellent building of the kind in the very heart of the metropolis; and with a few alterations it might yet be rendered comparatively safe against the ordinary accidents of fire,—we allude to Covent-garden Theatre. The slightest reference to the plan, and the description* given of it by its architect, suffices to show that twenty years ago very different ideas were entertained by professional men about fire-proof construction and fire-resisting materials than are happily usual at present. According to Mr. Edward Barry's own statement, the fire which resulted in the destruction of the old building was aided by the fact that no cross wall existed to divide the upper part of the stage from the auditory, and he says:—"Had such a fire-proof division across and above the roof remained, a check might have been given to the flames, so that the firemen on duty at the house might possibly have subdued them at the first outbreak." But in spite of these words, the experience gained from the deplorable absence of that division-wall does not seem to have been quite sufficiently appreciated in the construction of the present building. The enforced necessity of providing a back-stairs entrance for the Duke of Bedford, with a means of passage between the ducal box and "behind the scenes," is perhaps just one of those circumstances which in this case would tell disastrously should the calamity of a fire ensue. By the terms of the lease on which the land was granted, the Duke's agents, not content with ruling that the outside of the building should be coated with cement, demanded an ante-room, private stairs, and special entrance next to those of royalty; and should legislative measures be taken to inspect and enforce alterations in existing theatres, surely a clause in a ground landlord's lease should not be permitted to jeopardise the lives of less privileged people.

Nor should it be forgotten that when even the new theatres of the metropolis were rising it was still the fashion to talk of iron girders as fireproof, and that at this very hour the law of the country describes stone as an incombustible material, and ordains its use for stairs, landings, and supports of every kind. No doubt the acute lawyers, successful merchants, and others, who make our building laws, contemplate with vast satisfaction flights of stone steps, long and deep girders, slender columns, and other suicidal contrivances which help to compose our theatres; but thereon the opinion of the Fire Brigade is very clear and decisive. "No fireman has ever seen a stone stair escape when subjected to much heat."† "No internal wall supported on iron can be relied on when there is much heat." Writing, in 1876, Captain Shaw says, "At the present moment may be seen at the corner of two streets a new building, recently erected, 90 ft. long, 24 ft. deep, and from 70 ft. to 80 ft. high, supported entirely on iron columns, without any wall, wood or brick work, reaching to the ground along the whole line of front. At the ordinary temperature of from 60° to 70° Fahrenheit the whole building must inevitably fall down, and such a temperature could easily be created by the combustion of a small quantity of furniture." The accumulated experiences of the Fire Brigade show the general results of fire upon buildings in London thus:—"Bricks, uninjured; wood, seriously damaged, but only partially consumed; iron, fractured, and rendered worthless; stone shivered into fragments, and totally destroyed." In fine, no structure is fireproof, nor even fire-resisting, which depends for support or cohesion on any metal or any stone. On the contrary, walls of well-burnt bricks or of concrete composed of ashes, slag, or other materials which have been previously burnt, are fire-resisting, if not absolutely fireproof. And, to return to our previous illustration, when it is remembered that the very stability of Covent-garden Theatre depends upon naked girders and columns, and that, in Captain Shaw's words, "the cube of 60 or 216,000 cubical feet is the largest cubical capacity which can be protected with hope of success after fire has once come to a head," need there be any doubt of the necessity for early reconsideration and amendment of the existing Building Act.

It is, however, much to be doubted whether either House of Parliament will find time or inclination to take up the subject of theatre construction and superintendence until some notable loss of life has occurred in London itself,—the place best fitted for watching a catastrophe and reporting the results of it. There is, it is true, a certain exalted functionary connected with the theatres, who has uncertain duties to perform; and who, from time to time, issues a memorandum, which is published in the papers, and, we presume, is read by the managers and others to whom it is addressed. If, indeed, the traditional confidence which all Englishmen repose in a Lord Chamberlain is at last somewhat shaken, it is not because managers, money-takers, and theatre-attendants seem to ignore his instructions, but rather because, were they carried out in their integrity, they would in some particulars augment the chances of sudden death during a panic, and in others render audiences wild with indignation. Obviously the Lord Chamberlain is familiar only with the exclusive parts of an auditory, but he has probably read in the newspapers that there was once a pit to every theatre, and at the Haymarket he may have seen one. He has probably heard tell of a gallery and of "gods," but neither his subordinates nor himself are likely to mix with the demos while boxes and stalls are obsequiously opened to them. The Lord Chamberlain's memoranda are, however, jotted down with the best intentions; and they apply, in the official phrase, "to all exigencies," whatever that may mean. First, "all doors and barriers are to be fixed back while the public are in the theatre." Now this is a terrible alternative to fire and panic: in order to avoid being trampled upon or broiled, not only must the audience run the risk of pulmonary disorders, but also be debarred from hearing what is said upon the stage. "All gangways to be free of obstructions": this is read by managers and the public in various ways, and often by the substitution of the word *no* for *all*. "No part of the auditorium to be without at least two means of exit in case of need." Now this is satire. It cannot possibly be other than a veiled reproach to those managers whose theatres are so planned as to possess a single combined entrance and exit to the upper boxes, one only to the amphitheatre, one to the stalls, and one to the pit; or to others in which all the fashionable parts of the auditory converge by a narrow-winding passage to a narrow stair, at the foot of which is an equally narrow door. There are certainly grounds for the prevalence of a confirmed habit on the part of check-takers and money-takers, and itinerant supers in the garb of policemen and firemen, who, when a possible victim threatens to complain to the Lord Chamberlain, stare with strange emphasis and sometimes, like "the Alchemist," laugh consumedly.

Easy or safe exit does not depend upon the absence of obstructions; on the contrary, it is facilitated by judicious obstructions, provided they are strong enough to resist the pressure of a crowd. In all Parisian theatres portable barriers are fixed outside the doors just before

* See "A French Survey of English Theatres," in the *Builder*, 1867, p. 281.

* Transactions, R. I. B. A., 1859-60, page 53.

† Captain Shaw reports that at a fire which took place in the basement of a private house, "no fire whatever reached the stone stairs, and *nothing but heat*; no water was thrown on them, and no draught of cold air passed over them; and yet they were broken into fragments as far as the first landing."

the crowd begins to collect; and they are so arranged as to compel the public to wind into the building in single file. Safe passage does not depend upon the width of a flight of steps; on the contrary, if longitudinal barriers or railings were placed parallel to the sides of a staircase, and the stairs thus divided into passages just wide enough to permit persons to pass up or down in single file, people would be able to escape in any sudden rush with comparative safety. Staircases with open well-holes, and with their stone steps supported by one end only in a wall, are utterly unsafe; and in all theatres where they exist immediate alterations should be made. A solid wall ought to divide the flights, which should never be composed of more than thirteen steps,—short flights of nine steps are preferable,—and on either side of the stairs bounded by walls, a continuous hand-rail should be fixed at some 3 in. distance from the surface, for this hand-rail will offer a hold to people suddenly compelled to maintain themselves against a descending crowd. There are many small things which, with a very slight outlay of money, could be done in all existing theatres to improve their chances of escaping destruction. The use of hair in mortar, and the dangerous habit in England of leaving slender woodwork unprotected by any non-conducting or uninflammable substance, is a frequent cause of accident which as frequently leads to disaster. The covering of wooden beams with genuine plaster of Paris,—first having nailed laths upon the beam,—and the entire envelopement of a roof-truss or of floor-joists in such plaster will serve to stay the progress of fire; and wood so covered is known to have been preserved from the flames. Nor is a common stove unproductive of danger, for often a thin sheet of iron alone separates it from the wood floor; and, as Captain Shaw points out, the close stoves which burn the air are also injurious to wood and other combustible materials. In fine, so many dangers are, and must always be, incurred in scenic representations and among crowded audiences, that perhaps careful inspection of every part of the building, before, during, and after the performance, is more likely to secure the safety of even the assemblage of boards which form the internal structure of an ordinary London theatre than the most scientific combination of brick, concrete, and plaster, without constant supervision.

We suppose, therefore, that, either by plans or ocular examination, Captain Shaw and his men are familiar with the interiors of our metropolitan theatres; and that the last short paragraph in his chapter on duties* is not added for ornament or to complete the page. It is headed:—

"Watching Duties at Theatres, Public Buildings," &c. With regard to the watches in theatres, &c., the general instructions are for the men to make themselves acquainted with all parts of the premises, and with the means provided for extinguishing fire; to be vigilant in tracing out all causes of risk; to take active measures to obviate any danger that may arise; and, in case of fire, to use every effort to extinguish it, and at the earliest convenient moment to send a message to the nearest station, stating the nature and extent of the fire, and whether further help is required or not."

This programme, condensed into one sentence, is sufficiently comprehensive; but it must be confessed that the London fireman, unlike his Parisian colleague, the *pompier*, is not a conspicuous object in our theatres, inside which it would be agreeable to see more policemen as well as more firemen. In all parts of the house seats should be divided, and marked to hold a certain number of spectators,—a number which should not be exceeded under any circumstances; and some more disinterested control than that of a check-taker is required to effect this. But we doubt if desirable reforms of the kind can be accomplished so long as the Lord Chamberlain, to quote his words, "confidently leaves it to each manager to do his best" in such matters,—at least, in any of the ill-built houses which in London serve the purposes of a theatre. Much ado is daily and weekly made about nothing, but the lives of thousands is a matter about which we may be excused for making a little extra fuss. They are at present entrusted to an authority who, if a vote of censure were passed upon his reticence,—perhaps after a disaster in England similar to that of Brooklyn,—would resign office in an honourable and a dignified manner, and so satisfy conscience and custom.

* See "Fire-protection," p. 322.

Different people, however, look at duty in different ways. The watchman of Shakspeare was ordered to call at all the alehouses, and bid them that were drunk to go to bed, and if they would not,—"Why, then," replied Dogberry, "let them alone till they are sober; if they make you not then the better answer, you may say they are not the men you took them for." It would seem, from the experience of the last twelve months, that in this country managers are reasoned with in a similar fashion; and the watch kept over their theatres is doubtless of much the same quality.

OUR MATERIAL PROGRESS.

FIGURES are proverbially dry reading, but they largely lose their dryness when they relate to ourselves, and in some degree they become invested with personal qualities when they epitomise the progress of a nation. There has recently been issued an abstract for the United Kingdom, which shows its material progress for fifteen years; and it may be interesting to glance a little in detail at the outlines which mark the national advancement over so eventful a period. In its close columns of figures there is a wonderful amount of official information in regard to the United Kingdom, its wealth and its poverty, its births and its deaths, its trade, its bullion, and its mineral resources. It brings us down, it is true, only to the end of 1875, but supplementing it from other sources, we may glance for a while at the growth in these respects of the United Kingdom as a whole. First, then, as to the receipts and expenditure of the executive: the receipts at the exchequer in 1861 were rather over seventy millions sterling, and they increased irregularly, until, in the financial year ending in 1876, they were over seventy-seven millions, whilst the payments rose from seventy-two to over seventy-six millions. Neither in receipts nor in expenditure had the increase, however, kept pace with the increase of population. This increased gross income was in spite of the fact that the alterations of taxes in those years had repealed or reduced taxes to the extent of over thirty-eight millions; and it was accompanied by an increase in the property assessed to the income-tax from 335,188,318*l.* to 543,025,761*l.*, this increase being largely due to the increase in the value assessed on mines and houses. In the first year indicated we imported at a proportion of 7*l.* 10*s.* per head, but the proportion rose, in the last, to over 11*l.* per head. The animals imported increased fourfold in value; the bacon and hams increased five-fold; the butter nearly doubled; cheese trebled in value, as also did chemical manufactures; cocoa nearly doubled itself; coffee increased nearly fourfold; wrought and manufactured iron and steel increased in even larger proportions; raw sugar added about 50 per cent.; the six million pounds' worth of tea doubled itself, wine rose in like ratio; the woollen manufactures were tripled, and the value of the whole rose from 217,485,024*l.* to over 373,000,000*l.* But this was accompanied with an increase of the declared value of British produce from 125,102,814*l.* to 223,465,963*l.*; linen manufactures doubling, cotton manufactures increasing fifty per cent., iron and steel goods doubling in value, silk manufactures swelling, and woollen and worsted also increasing.

To meet this vastly increased trade we imported of gold and silver bullion and specie, in the first year, close upon nineteen million pounds' worth, and this quantity had increased to over thirty-three millions' worth in the last; but we exported 20,800,000*l.* worth in the first year, and 27,628,000*l.* in the last. There entered and cleared from our ports vessels representing a tonnage of over twenty-six millions in the first year of the period under review; but, at the close, the amount had risen to over forty-six millions; and it shows the tendency of the age to be reminded that the steam-vessels which entered increased from five million tons to over twenty-five million tons in that time. There has not been the same progress in agriculture, for the acreage devoted to corn crops,—some nine million acres,—rose only a quarter of a million in Great Britain, and slightly fell in Ireland. The land devoted to green crops,—over three millions,—increased, but at a smaller rate, and slightly decreased in Ireland. Other crops, such as flax, added half a million to the four millions in the first year to Great Britain, and the permanent pasture was enlarged from eleven million acres to thirteen millions. The orchard area fell, the market and nursery gardens slightly increased, and the woods were tolerably stationary. The horses and cattle we owned were added to, as also were the sheep; but the pigs fell off in number, except in Ireland.

Our railways increased in length from 10,000 to 16,000 miles; their capital was raised from 362,000,000*l.* to 630,226,000*l.*; they conveyed at first 173,773,218 passengers, and in the last year 537,532,187, and their receipts arose from over 28,000,000*l.* in the year to over 58,000,000*l.*, or from 2,628*l.* per mile to 3,539*l.* per mile. The mines were more productive. We raised 83,635,214 tons of coal, and this was increased in quantity to over 130,000,000 tons. The pig-iron rose from over three millions to over six millions tons; the copper fell off in quantity, as did also, though more slightly, the metallic lead, and the silver from lead. Finally, the estimated value of the coal and metals increased from over 34,602,853*l.* to over 65,000,000*l.*

The population was increased from 28,974,362 to one estimated at 33,089,237 for last year. The births increased in England and Wales from 696,406 to 850,187; the deaths from 435,114 to 546,317, and marriages from 163,706 to 200,980, whilst in Scotland there was not a material difference in the ratio; but in Ireland there was a slight falling off in the births, an increase in the deaths, and a falling off in the number of marriages. We nearly trebled the school accommodation; there was a gratifying decrease in the number of paupers, exclusive of vagrants,—except in Ireland; and it is satisfactory to note that there was a decrease in the number of criminal offenders. In the first of the fifteen years some 593,000,000 of letters were delivered, and 85,000,000 of newspapers and book packets; but in the closing year of the series there were 1,009 million of letters delivered, and 280,000,000 of papers and book packets; whilst in five years the ordinary telegraphic messages increased from 8,000,000 to 20,000,000; and in the longer period the number of money orders was raised from 7,000,000 to 16,000,000. The capital in the Post Office Savings' Bank was raised from 5,000,000*l.* to 25,000,000*l.*; and in ordinary savings banks from 41,000,000*l.* to 42,000,000*l.* And, finally, the British emigrants from the United Kingdom rose from 65,000 annually to 140,675, whilst the immigrants increased also, though in less degree. Thus, in fifteen momentous years our material and other resources have been developed and increased, and if this has been done in the past, we may regard the present apparent period of decline in trade as a mere ebbing of the tide, which will only serve as a mark for the further advancement in the future to be gauged by.

RESTORATION OF CHURCHES IN DORSET.

AT the January meeting of the Salisbury Diocesan Church Building Society on the 2nd inst., 100*l.* were voted towards the rebuilding and enlarging of the parish church of Stoke Abbott, Dorset, the works to include the erection of a new aisle on the north side, incorporating with it the transept at present existing, the removal of an unsightly gallery at the west end, and thoroughly restoring the fabric generally. By this means the existing accommodation will be increased from 120 to 210 sittings. It appeared the estimated cost was about 2,000*l.*

In the case of Milborne St. Andrew's Church, a grant of 60*l.* was promised towards an outlay of 2,400*l.* required for the restoration and enlargement of the parish church, whereby increased accommodation will be secured for the large outlying population attending the church. It is proposed to rebuild the chancel, adding to it a chancel aisle, to erect a north aisle to the nave, and to reseat the entire edifice.

Rail and Rain in London.—At the half-yearly meeting of the Metropolitan Railway, held on the 19th inst., the chairman, Sir E. W. Watkin, said that although the Metropolitan was a line running under cover it was greatly affected by the weather. Scientific men knew that during the past six months there had been eighty-five wet days, and the total rainfall had been 18 in.; and, as a matter of fact, he could say that every wet Sunday cost the company 120*l.* The reason was that it had to run the same number of trains, employ the same staff, and took so much less money on those wet days. A wet week diminished the takings by fully 300*l.*

EARL GRANVILLE ON TASTE.

IN delivering the prizes at the Dover School of Art the other day, Earl Granville took the occasion which naturally presented itself to make some general remarks which most of our readers have seen reported in the daily papers under the heading of "Earl Granville on Art,"—a heading which we do not copy in commenting on his lordship's remarks, since these had, in fact, little immediate bearing upon art itself, but were directed rather to the consideration of the degree in which the appreciation and love of art existed among the English people at present, and whether it had increased or diminished of late years. The opinions of an accomplished man of the world, occupying a high position in the country, upon a topic of this kind, are always of interest as evidence of the attitude of society towards art and artists, even when the speaker claims no special knowledge or special faculty of teaching on the subject. Earl Granville, whom we may take to be one of the very last persons who would assume to speak on any subject further than his own knowledge of it warranted him in speaking, perhaps rather underrated his own opportunity on the occasion, and the interest which might have attached to any critical expression of opinion from him as to what was right and what was wrong in the art of the present day. But what he said upon the taste of the present day was much to the point, as bringing forward a side of the subject which has been ignored of late. Referring to two recent addresses by Mr. Poynter and Mr. Mark Pattison on the subject of art, he summed up the purport of those addresses as amounting really to this,—that there was a great deal of taste in the present day, but it was all bad. This pessimist view of the matter his lordship undertook to question, and even contradict, and we must say with considerable success. Mr. Poynter's address, which was printed and referred to in our columns not long since, no doubt was in the main absolutely true; all the artistic iniquities he complained of really do exist; and a gifted artist anxious for progress in the future may naturally be disposed to take every opportunity of pointing out how much room there is for improvement in everything. Mr. Mark Pattison's address was not, as we thought at the time, either relatively or absolutely true in the picture which was drawn of the retrogression of public taste of late years. It is true, as we have often and even recently pointed out, that vulgarities of design, which have been condemned over and over again, are continually re-appearing; and that a large proportion of persons will still, if left to themselves, buy decorations of these vulgar and inartistic types in preference to what is distinguished by a purer taste. Nor do we ever expect it to be much otherwise. More or less, true and refined taste in art will always, in all probability, be the characteristic of the few rather than of the many. But that things are rather better than worse during the last thirty years is a position which Earl Granville quite justifies himself in taking up. No one can controvert what he asserted: that far better taste is exhibited in church architecture (even if merely imitative) than formerly; that there is improvement going on, however partially and slowly, in street architecture; that the house of Minton would no longer have to complain, as its founder so pathetically complained, that every one desired to buy his worst and most tasteless productions. The increasing taste for flowers, for art-needlework (if one may thus put nature and art together), is incontrovertible; the improvement in the taste and style of illustrated books for children even more so; and this last is an important point, for much in the education of public taste depends on what a child is trained to admire and take pleasure in while quite young. As to improvements in ladies' dress, there is less room for any positive congratulation, if we take it over a long period of time; for during the last quarter of a century this very variable taste has improved and deteriorated again several times. But in regard to all the other topics touched upon by Earl Granville, we believe no one can fairly contradict his conclusion, that taste in this country has materially improved during the past thirty years; and if so, how can we say the artistic taste of the public, taken generally, is deteriorating? It is a great mistake to criticise one's own day too leniently, and to represent things as better than they really are; but, on the other hand, we cannot see either the pleasure or the advantage of representing them as worse than they are; and as there has been a little too much of this lately, we must thank Earl Granville for his word in season on the other side of the question.

The one remark in Earl Granville's address which touches directly on methods of art-education is pleasantly put and very much to the point:—

"He remembered when he was a boy learning drawing at a private school, and he remembered taking four months, under the vigilant care of its master (he believed a very good master of drawing), to draw a very beautiful church. He engaged the master's care, he copied every line and portion of a line, and he was not quite certain that he did not have some of the master's lines as well (laughter). When his holidays came round he took home the picture triumphantly, and in a state of perfect delight and astonishment. But they could not conceive how he was disconcerted, how very much surprised he was when he was asked by his father to reproduce his church on a bit of paper,—this celebrated church,—and he found himself utterly unable to make even the attempt (laughter). Now, what did Mr. Duckett do at this Dover school? He was not so ambitious as to give them a church to draw at first, but he gave them, say, a leaf, or a cup, or a box, that so they might exercise their hands and eyes too, and acquire the habit of observation in reproducing objects from the originals and not from copies which he had made. He ventured to say whether they became artists or not that they would learn in a week of such teaching more than he did in the four months he so conscientiously gave to the drawing of his church in his early youth."

The distinction between drawing from a natural object and drawing from somebody else's representation of it is, as most persons perceive now, a very important one. Perhaps we should have been disposed to carry the contrast a step further, and say something as to the difference between copying as an end in itself and copying as a means of improvement and instruction. In too many of our schools of art there is far too much of the former system, under which pupils are encouraged to labour for weeks or even months at producing a minutely finished drawing of some one object, as if that were an end in itself; whereas the whole object of drawing what we see is (or should be) to enable us to draw what we do not see, except in our mind's eye. Drawing from the model is the only sure basis; but drawing apart from the model, exercising thought and memory as well as hand and eye, should be made a more important part of art-teaching; as indeed Earl Granville's own anecdote of his early experiences implies, though he did not directly make this application of it.

EAST LONDON INDUSTRIES.*

THE interesting little book under this title, dedicated "to capitalists, manufacturers, merchants, shipowners, traders, working people, and all others engaged in carrying on, or interested in, the industries of East London," has for its main object, as we gather from the preface, to enlighten some little at least of the proverbial ignorance of one-half of the world as to the ways and doings of the other half. Mr. Crory seems to think that a very large proportion of the wealthier classes have just that degree of acquaintance with East London which was implied in the query of the gentleman at his club in *Punch*, who confidentially told the waiter that he had to go to "a place called Islington," and inquired if it was likely that he would be able to get there in a cab. In reprinting in a more extended form, and with careful revision, these papers, which were originally contributed to a local journal, the author hopes to do something in vindication of a portion of the inhabitants of this metropolis who have been, and are still, to no small extent misunderstood; and to show that, in many respects, East London stands entitled to a higher place than other divisions in public esteem; and that "unless all seaports and manufacturing towns are to be regarded as merely mission fields in religious matters, and places for little else than philanthropic effort in things social, this locality must not be spoken of or treated as if it were a part of some uncivilised country, or one in which heathenism prevails."

The method of the book consists in giving special accounts of the general nature and some of the processes of the trades upon which so great an amount of human industry and ingenuity is daily expended in the east of London, with some indications of the social status and character of those employed, and the manner in which the carrying on of the various trades influences the life and well-being of the workers therein. A large number of trades and factories are described, evidently from personal observation and with a desire to give a truthful and reliable account of each subject illustrated. The topics treated of include jute-manufacturing, iron ship-building, paper-staining, gas-making, the manufacture of matches, and many others; and no one can read these accounts without a strong impression as to the amount of useful and skilled labour which is gone through day after day in this (to many) *terra incognita* of the capital. The chapter on the silk trade is a very interesting and suggestive one, as also are those on gas-making and chemical works. In regard to the latter, it is of interest to note that the author's inquiries have led him to the conclusion that chemical works are not unwholesome; and as a proof that they are specially free from causes of disease, he mentions that in the last visitation of cholera not a single workman attached to the large establishment which he visited had died of the disease. The silk operations are largely carried on at the houses of the workpeople, which seem to have impressed the author very favourably as specimens of happy and industrious homes. He notes also the confidence which is shown in the operatives, in entrusting them with goods to be woven, the gross value of which is far beyond the wages paid for the work, but which are always safely and honestly returned to their owners after being woven. It is curious to learn, considering the infinitesimally small prices at which matches appear to be sold, that match-making is, nevertheless, a trade better paid than some kinds of sewing. The paper-staining trade appears to have impressed the writer very favourably in its results upon those employed in it. He thinks that—

"Even the men and boys at the machines in paper-staining works must be benefited by having so constantly before their eyes orderly arrangements of the most beautiful things in nature, and combinations of flowers, &c. . . . . I did not wonder then to see a superior class of workmen and very bright-looking boys in all the manufacturing departments. The conduct of these people at their work indicates that they are of a good type of the 'working classes,' as we seem inclined to call those in certain departments of labour, whilst, strange to say, others who work as much, and often get less for it, are not so designated. . . . . Such is one other of the works carried on in the East of London. I need hardly say that Old Ford is not Belgravia, but I must also add that it is neither a disagreeable place to visit or to live in, nor is it inhabited by a population in any sense or in the smallest degree uncivilised. But a few years ago the site on which stand these works was in the open fields. The ground all around even now is largely covered with good and comfortable houses. Old Ford-road has a good many shops, and Roman-road is quite a market."

Importing and dealing in foreign beasts and birds is a trade which, especially *apropos* of Mr. Jamrach's establishment, furnishes a chapter of East London Industries, in the course of which the writer's remarks upon the open profligacy in the district along the docks line east of the Tower, and the importance of doing something definite to check or regulate it, are much more to the point than his foolish and entirely gratuitous attack upon Professor Huxley for some remarks on a subject which Mr. Crory evidently does not in the least understand; indeed, he knows so little about the matter as to credit the Professor with having "invented" a theory of derivation of species which, as every one else knows, is identified with the name of Darwin. Philanthropists have a bad habit of going "beyond their last"; but the general usefulness and good intent of Mr. Crory's book cannot be denied, and we hope it may do something to further the desirable result which he thinks the visit of the Queen to East London last year tended to inaugurate, in "breaking down the inexplicable prejudice existing in the public mind against everything to be found, and all persons residing, east of Temple Bar; drawing Belgravia towards Bow, and letting Clapham and Hampstead see that Whitechapel, Stratford, and Shadwell are places of just as much importance, however different in some respects, as any others in the metropolis." We recommend our readers to get the book (it is a small and inexpensive volume), and give their consideration to the facts and suggestions embodied in it.

* East London Industries. By. H. Glenny Crory. London: Longmans, Green, & Co.

Improved Industrial Dwellings at the Commercial-road, Pimlico.—A very heavy foundation is now being put in here, by Messrs. Holland & Hannen, for the Improved Industrial Dwellings Company, nearly an acre and a half being covered with one solid mass of concrete, from 6 ft. to 8 ft. thick, also the retaining walls of concrete. Mr. W. Ward Lee is the architect, and the quantity of concrete required is from 10,000 to 20,000 cubic yards. The site is close to Grosvenor-road Station and the north end of Chelsea New Bridge.

MR. THOMAS PAGE, C.E.

ONE of the last links that connected the present rising generation of engineers with the traditions of the grand old school, of which the Rennies may be mentioned as typical, has been severed by the sudden death, on the 8th of January, at Paris, of Mr. Thomas Page. Born in London in 1803, Mr. Page was educated at Ronald Kirk, on the banks of the Tees, for the sea service, and the frank, careless, genial manners which characterise the English sailor were never obliterated during his subsequent career. The advice of Mr. Tredgold turned the attention of the young man to the study of engineering, and he acquired a knowledge of the details of the mechanical part of the profession as a draughtsman in a steam-engine factory. He subsequently became one of the assistants of Mr. Edwin Blore, architect. By this double education in scientific detail, Mr. Page laid the foundation for that excellence by which his works were, in after times, distinguished, namely, the coincidence of science and of a certain amount of good taste. A prize is now proposed in France for the best essay on the essential and characteristic differences of the studies of the engineer and of the architect. Mr. Page combined the two. While engaged in architectural work, Mr. Page made a detailed admeasurement of Westminster Abbey; and had the good fortune to discover a passage, previously unknown, leading from the south transept to the crypt of the chapter-house.

Mr. Page's next engagement was that of sub-assistant engineer on the Thames Tunnel, the works of which were being carried on by the late Richard Beamish, C.E., F.R.S., under Sir Mark Isambard (then Mr.) Brunel. No practical school for the education of a hydraulic engineer could exceed this position, in the demands hourly made on the vigilance, intelligence, and invention of the engineer in charge. The duties of the position were not confined to the daily inspection which is all that is within the power of a sub-engineer entrusted with the care of ten or fifteen miles of railway or canal. They involved constant presence, throughout the twenty-four hours, of at least one member of the small working staff. And very frequently that presence at the face of the work was attended by the conviction that the watcher had in his hand, not only his own life, but also the lives of the numerous workmen employed in the tunnel. The writer of these lines can well remember his first introduction to Mr. Beamish; and the appearance of that able engineer, clad in a suit of tarpaulin, his head encased with a large north-wester hat of the same material, as he emerged through the thin veil of falling water which at the moment was descending between the shield and the finished brickwork; looking, with his long dark hair and large dark eyes, like a young river-god disturbed from his slumbers. In 1836 Mr. Page succeeded Mr. Beamish as resident engineer of the tunnel, which he had the good fortune to complete, together with the shaft on the Middlesex shore.

Mr. Page's designs for the embankment of the Thames from Westminster to Blackfriars Bridge were recommended for adoption by the Commissioners for Metropolitan Improvements in 1842. Among the competitors were the then famous firm of Walker & Burges, Sir C. Barry, and Colonel Ffrench. The work was not, however, at that time prosecuted. In 1843 Mr. Page completed a survey of the Thames between Battersea Bridge and Woolwich. It would be at once a worthy monument to his memory, and a permanent advantage to London, if that survey were now published in a form to make it readily accessible to professional men, and to afford data for estimating the change which has subsequently been effected in the channel of the river. A report on the tidal action of the Thames was also made about this time. In 1848—1849 Mr. Page laid out new lines of communication between Windsor and Frogmore; building the Victoria Bridge over the Thames at Datchett, and the Albert Bridge near Old Windsor. The road from Chelsea Hospital to Vauxhall Bridge, the Chelsea Embankment, and the Chelsea Suspension Bridge, next occupied his attention. In 1844 he also made a report on the harbours of Holyhead and Porthdyn. His advice was repeatedly sought by the Corporation of London with reference to the Thames, and he was called on to report, in conjunction with Sir John Rennie, as to the schemes for widening London Bridge.

In 1859 Mr. Page drew up an important report as to the advantages of the noblest harbour on our coasts, Milford Haven. In 1860 he presented a very able report with reference to the improvement of the river Nene from Peterborough to the sea, a measure previously advocated by Rennie; and by his advice, and by his evidence before Parliament, he is held to have saved the town of Wisbech from decay, if not from destruction, though the Wisbech people, we hear, give him no praise for what he did. The Lendale Bridge at York, and the bridge at Thornton, were built from the designs of Mr. Page; and his design for a new bridge at Blackfriars was accepted by the Corporation, in a competition with seven others, although the Common Council afterwards adopted the plan of Mr. Cubitt, on which the present bridge was built. Mr. Page either constructed, designed, or reported on, numerous other works. He was consulted as to the reclamation of a portion of the shore of the river Tagus, where it passes Lisbon, and as to a railway from Lisbon to Cintra. But the work which remains as his noblest monument is Westminster Bridge. He constructed this without the use of either coffer-dams or centres, and by the expedient of carrying over the roadway half at a time (longitudinally divided), he avoided both the cost of a temporary bridge, and the inconvenience of any interference with the traffic, either by land or water. The tremulous movement which is so perceptible to the foot-passenger on this bridge, when any rapid and heavy vehicle passes, may lead to the suggestion whether Mr. Page would not have done well to give greater weight to his girders, and, even at a considerable extra cost, to have added to the sense, if not to the prospect, of security. But the architectural effect of the structure, no less than the skilful distribution of a minimum quantity of material, are such as to reflect the highest credit on the engineer. Nor should we omit to mention the architectural merit of Mr. Page's Suspension Bridge at Chelsea. When these two graceful structures are compared with some which it is unnecessary to name, it will be forcibly seen of what advantage to the civil engineer is a practical knowledge of the sister art of architecture; and how far that which may be thoroughly adequate as far as strength is concerned, but which has been designed without any reference to architectural elegance, is from pleasing or satisfying the eye. In fact, the existence of such works not only presents an eye-sore and a grief to the man of taste, but has a positively bad effect on the education of the public. In contravention of all for what we have been labouring since 1851—all efforts to teach by the eye, and to awaken the sense and love of beauty in the English mind—the erection of any structure which may be convenient but which is undeniably hideous, is a step backwards, and a positive evil to society.

Mr. Page's death will be regretted by a large circle of friends. His works form a noble monument to his memory; but the best tribute that can be paid to it by his admirers will be afforded by their endeavour to follow his example in the particular excellence of combining engineering science with architectural taste.

THE MONUMENTAL CLOCK OF BEAUVAIS.

JUST before the disasters of the Franco-German war, the expanding catalogue of the world's wonders was augmented by the completion of a grand monumental clock, destined thenceforth to form the most cherished ornament of the Cathedral of Beauvais. This extraordinary work, upon which some of the most accomplished artists and skilful mechanists of France were for years employed, will certainly not rank last amongst the marvels of a century that has been prolific of conquests in every province of the wide realms of physical science and art. Our own country affords no example that might furnish a standard of comparison with such a master-piece; to find one we must repair to Strasburg, Lubeck, Lyons, and a few other famous towns, renowned of old throughout Europe as flourishing seats of industry and opulence. Horology, like architecture, is both a science and an art, embracing within its own scope every other, and in its most consummate forms displaying their practical application. The design of such a work as we propose to describe could be produced only by the most abstruse research and laborious calculations; its execution requires the conjoint efforts of at least twenty different classes of artists and artisans, whose several duties exact skill and intelligence of the highest order. Accordingly, its fitting place is in one of those vast temples reared by the genius and self-denying piety of our ancestors, and intended to embody in durable forms all the most precious results and choicest fruits of the scientific knowledge and artistic studies, not only of their own, but of succeeding ages. A great clock like that which has so long been the boast of Strasburg is an appropriate decoration for a great minster, since the construction of both fabrics enlists the noblest faculties of man in the service of religion. Its primary object is the measurement of time, but its vastness of size, and the multiplicity of parts and works required for illustrating the revolutions of the celestial spheres in their meted courses and periods, tend to that infinity which is only another name for eternity. Its dials show forth the wonders of the heavens, which, the Psalmist tells us, declare the glory of God, and His handiwork in the firmament. For clearness, and to facilitate the comprehension of details, we shall divide the account we have to offer of this magnificent fabric into three distinct sections, which may be styled respectively the Clock-case, the Interior Mechanism, and the Legends of the Dials.

I. *The Clock-case.*

The new clock of Beauvais far surpasses that of Strasburg in the majestic unity and symmetrical beauty of its external aspect. Unlike its ancient rival, it is enclosed in a single and self-contained structure. This consists of a square tower, with arched roof, 40 ft. high, 16 ft. broad, and 9 ft. deep, solidly compacted of the best walnut-tree wood. The design adopted for the frontal presents to the eye, on a reduced scale, the architectural members of a façade of the Romanesque or Byzantine style. The principal feature is an arcade of three bays, the summit of which is 26 ft. from the floor, surmounted by the grand dial, which occupies the place of the round or rose window in a stone edifice. Every part is richly carved with the billet, diamond, and besant mouldings peculiar to the late round-arched style, and the capitals of the columnar shafts supporting the arcade exhibit palm-branches and quaint foliations of variegated patterns. Above and beneath the dial, in the spacious tympan formed by the superior archivolt, is an elaborate series of sculptures, representing, under the forms and with the details familiar to the lovers of Mediæval art, the World, the Life of Man, and the Last Judgment. This is unquestionably one of the finest specimens existing of the wood-sculptor's art, and a minute description might demand as much space as we can afford to devote to the whole subject of this article. Every detail is studiously wrought out and arranged so as to convey symbolically to the mind the relation of the scenes and objects here figured to the immediate purpose of the entire structure. In the lower region of the composition, under the dial, and directly over the arcade, appears a turreted city with a river flowing through it, aptly imaging the world and time. The four ages of man's life are designated severally by statuettes of a child playing at shuttlecock, a youth, an armed warrior, and an old man bending under the weight of a wallet filled with gold, of which Death is soon to strip him. The seven cardinal virtues that adorn the Christian character, the seven deadly sins of its besetting temptations, guardian angels and malignant fiends, fill up the piece; St. Michael holds his balance, and above all appears the Saviour coming to judgment. The sculptor conceives human life as personifying the course of time; individual figures may be regarded as emblematic of the hours, which form one of its main divisions; and the four ages designate the quarters. Immediately before the full hour strikes, a cock,—the bird which Scripture associates with the remorse of Peter, and which has ever since been held the emblem of conscience and its warnings,—claps its wings and crows. The hour strikes, the figures seem to be suddenly imbued with life and motion, and on the Saviour's left hand flames are seen to issue from the openings of niched galleries, and the condemned appear with their tormenting demons. The main dial, with its richly-enamelled surface, of course forms the most prominent and conspicuous object of the whole frontal. Its diameter is not less than 5 ft., which gives a circumference of more than 15 ft.; in the centre the figure of the Saviour again appears in his character of Redeemer of the world, and the needles that point to the seconds, minutes and hours, thus radiate

directly from the Divine Person who is the author of time and the embodiment of eternity. Gold and colour are judiciously employed, and the effect of the whole front is grand and gorgeous to a degree which the pen can but faintly describe. In short, the case forms a worthy setting to the jewel it enshrines. Besides the main dial, the clock has twenty-four secondary or minor dials, eighteen on the front and three on each of the lateral faces. This, however, by no means exhausts the catalogue, for two of these, as will be seen by and by, are in fact, groups composed of one large central and eight subsidiary dials of the tertiary order, whilst two others form similar groups of four, so that the whole number of individual or independent dials in this great horological system, including that of the reverse face and a small seconds dial, is forty-nine. The reverse face of the clock, also highly ornamented with sculpture and carving, though less profusely than the front, has the middle section open, for the purpose of displaying to view some part of the machinery.

II. *The Interior Mechanism.*

In our social economy, correct measurement of time is an object of importance second to none, and the machinery which secures this, with its ingenious and nicely-adjusted adaptations, is a never-ceasing object of interest to every intelligent mind. The steam-engine, and the weighted train which forms the driving-power of a clock, are the two exemplifications of dynamical force which are oftenest present to our eyes, and both offer instances of practical results and applications immediately deduced from natural laws. In the one we see in constant action the chemical forces of destruction and reproduction which pervade the whole domain of matter, and maintain the balance of life and death in the animal creation; in the other we have vividly illustrated the simplest and most universal of mechanical laws, that of gravitation. Were it not for a constant and abundant supply of fuel which gluts its insatiable maw, the steam-engine would be powerless. But in the clock-train no secondary or intermediate agent is evoked; it is itself the embodiment of its principle, and derives its impulse directly and in a continuous stream from the great principle which holds the universal scheme of things together. In all clocks, large and small, the constructive principle is identical; the motive power being generated by the fall of weights acting upon wheels, whose revolutions, regulated by balances, are made in a determinate time, and produce at a precise and foreseen instant the expected effect. Ancient clocks, through ignorance of the true theory of the pendulum, were without such regulators as would enable them to go truly for any length of time. The pendulum is itself controlled and impelled by the escapement, a contrivance of which there are many different sorts, all having the same object,—that of forcing the oscillation of the pendulum to preserve the most perfect regularity. This is effected by a mechanism that seizes and lets go or "escape" alternately the teeth on the opposite sides of the ratchet or notched wheel, so that each tooth of the rotation shall exactly correspond to a single vibration of the pendulum. The component parts include the scape-wheel, the pallets with their arbor or axis, and the bent lever attached thereto, called the crutch, which maintains the motion of the pendulum, and prevents it from subsiding through the resistance of the air. By the escapement the circular motion of the train-wheels and the vibratory motion of the pendulum are equalised and made convertible. The soul of the art of clock-making is the calculation and ascertainment of numbers,—proper, when reproduced in mechanical expression, for representing given periods of time. All the wheels and pinions must be in exact geometrical proportion to each other; and unless the respective size, shape, and disposition of every limb or part of the frame are properly adjusted, the communication of motion and transmission of maintaining power will both be unequal, and the mechanism will be subject to rapid destruction. Planetary clocks represent the motions of some of the best known heavenly bodies by appropriate wheel-work superadded to the usual trains; the annual and monthly movement being effected by a combination of discs, wheels, and pinions, called the calliper. It is necessary to say thus much, because the principles of clock-making have seldom or never been explained in language comprehensible without a knowledge of the higher mathematics, aided by illustrative drawings.

In the clock of Beauvais the lesser wheel-work and the escapements are for the most part constructed of brass, and finished with exquisite nicety. The motorial system, which gives the impelling power, comprehends one principal and fourteen secondary motors, with their respective trains. A prominent object in the view of the interior opened to the spectator is the chief motor, resting upon the cases that inclose two of its subordinates. It is constructed, for the purpose of relieving the supporting pivots, in duplicate, with two weights of 24 lb. each, and two cylinders. The pendulum which regulates these powerful forces weighs 115 lb., and has a double system of compensation, in order to guarantee its uniformity of action under all changes of temperature. The main rod is a complex trunk of nine minor rods, five of steel and four of copper. The bob, which is lenticular, of the old round form, could not be attached to the trunk by its centre, because this is the place reserved for an apparatus of regulation by M. Vérité, the well-known and distinguished engineer to whom the design of the clock and the fabrication of its mechanism are due. In order, therefore, to connect it with the trunk, it is grasped at the two extremities of its horizontal diameter by steel rods inserted in cylinders of copper, which have their lower extremities resting upon cross-bars attached transversely to the upper system of compensation, leaving the bob and the rod distinct unities, and determining the length of the whole pendulum, and consequently the arc of its vibration, with the nicest mathematical accuracy against all contingencies of weather. To one looking through the open portals of the interior, the anchor-escapement, with its action, forms a beautiful and attractive object of contemplation. In order still more completely to ensure the operation of this complex machinery against all disturbances, it is fitted with the apparatus above alluded to, which the French clockmakers call the *remontoire d'égalité*, or restorer of equality, and which we may translate the equilibrator, or self-adjusting resetter. This consists of a sliding weight (only a single gramme, the five-hundredth part of a pound), and a spring lever, but we despair of making its mode of action intelligible to the reader without the aid of a diagram. By this ingenious and elegant adjustment, M. Vérité has arrived, not merely at an approximate, but complete solution of that great problem of constancy of force and regularity of action, the successful treatment of which was first made possible 200 years ago by the discoveries of Huyghens, who determined the theory of the pendulum. The maintaining power used in the clock for keeping the motion alive during the process of winding up is the same with that known to English clockmakers as Harrison's going-barrel.

Next in the order of description comes the dispart, or apparatus connecting the chief motor, which is the source of activity, and one may almost say the principle of vitality, to the whole mighty body of the clock, with its fourteen secondaries. The dispart consists of two revolving discs set on the same axis and in parallel planes, the first of them carrying a spring-pin, which takes in turn one of sixty teeth cut in the circumference of the second disc or ratchet. This latter carries on its centre an indented cone or fusee, the instrument that transmits the motive impulse to every quarter of the vast and almost animated frame. The dispart performs one rotation in the hour, and hence it follows that if the head of the spring-pin connecting the two discs is raised, and shifted only one tooth backwards or forwards, the operation will accelerate or retard by a single minute the hands of every dial in the clock, whether their revolution be accomplished in an hour or in a century. The chief motor directly communicates movement: 1. To needles charged with indicating time on more than twenty different dials; 2. To the sun and moon on the solar and lunar dials, for, by a necessity of the representation, the orbs of both are made to gravitate (as they appear to do in nature) round the globe of the earth; 3. To the needles indicating sidereal time; 4. To two planispheres, or projections of the celestial sphere on the plane surface of the dial; 5. To the rotating dial which shows eclipses of the sun; 6. To the needles of the repeating dial placed on the reverse face of the clock; 7. To the single needle of a little seconds dial, placed beneath the pendulum, and counting its oscillations. Grouped around the chief motor are the fourteen secondaries, each with its weight, and its movement regulated by a fan-fly. In two of them, the better to insure regularity, the action of the fan-fly is assisted by that of a conic pendulum. Every one of these motors, though itself an independent source of action, has its time of operation governed and indicated by the chief motor, through the connecting machinery of which we have given an outline.

III. *Legends of the Dials.*

The plan of construction adopted by M. Vérité throughout the complicated details of his fabric, not less than that of the case which incloses it, appears much superior in unity and simplicity to the plan of the long-celebrated clock of Strasburg. The latter is, in fact, a combination of a clock and an orrery, with spheres celestial and terrestrial, which aim at such unattainable minuteness as exhibiting the procession of the equinoxes. This phenomenon, otherwise known as the regression of the equinoctial points in etherial space, advances at the rate of one degree in seventy-two years, and is, therefore, supposed to accomplish a spheriform rotation through space in the prodigious interval of 25,920 years. What probability is there, supposing the existence of our globe to continue during such a period, that the materials of the clock would not be in great part reduced to dust before its expiry? The attempt, therefore, may be said to accuse itself of imposture, and the artist of Beauvais has shown sound judgment in not pretending to such an impossibility, though Schwilgué, the reconstructor of the Strasburg clock, did not consider it beyond his powers. M. Vérité is equally to be commended for having discarded what is called the millennary or perpetual calendar, with its complex apparatus of millennary and myriadetic circles, revolving in periods of 1,000 and 10,000 years, and projecting time, so to speak, into endless duration. The practical connexion and adaptation of this apparatus to the ecclesiastical computory, or to any other member of the horological system of the clock, has never been distinctly explained, and may be regarded as more than doubtful.* The Beauvais clock is solely and thoroughly a clock, and rejects the mechanism of the orrery except in miniature, exhibiting the planetary movements on some of its many dials, which we now proceed to enumerate in their order.

The main dial, to the ornate construction of which we have already alluded, shows mean time, or the ordinary division of the day into hours and minutes; the notation being of the two diurnal moieties of twelve hours each, the twelfth numerals being replaced by the words *minuit* and *midi* (midnight and morn) at the uppermost and lowermost scroll points. The central compartment of the architectural design described in the first portion of this article presents a group of twelve secondary dials, directly under the main dial, and occupying the middle section of the front. Of the twelve one is placed centrically, the others encompassing its top and flanking its right and left sides in the fashion of a garland, or rather of an embracing archivolt. The centrical dial, No. 1, shows the notation of the ecclesiastical computory. Five concentric circles, each with its own hand or needle, are inscribed on the surface of the dial. The notations of each, in white enamel on a blue ground, are admirably distinct, every needle ending in a gold ring, which at midnight of the 31st December every year indicates the figure or letter to which it is to point for the whole year ensuing.

The largest and outermost of the circular scrolls bears the notation of the twenty-eight years of the solar cycle. The succession of periods so named, it may be remembered, began nine years before our era, and at the end of each period the year commences on the same day. The second circle gives the dominical or Sunday letter for each of the twenty-eight years. The third circle gives the golden number designating the particular year of the lunar cycle of nineteen years or 235 lunations, at the expiry of which the new and full moons coincide, the sun and moon being then in the same points of the heavens as they were nineteen years before. The lunar cycle was dis-

* An elaborate work on the Strasburg clock, fully explaining its construction and action, was promised thirty years back by M. Schwilgué's son and representative, but it has never appeared. The clock, it may be observed, was originally finished in 1573, and ceased to go in 1789, the *annus mirabilis* of France. It was restored by the labours of the above-named distinguished engineer, and solemnly reinaugurated in its functions by the Annual Congress of French Savants in 1843. It contains 600 wheels, and 297 springs. Those of the Beauvais clock are probably more numerous, for, though more simply constructed, its dials outnumber those of the other ten-fold.

covered by the astronomer Meton 433 years before our era, and the Greeks in their enthusiasm engraved it in letters of gold on the walls of their temples,—whence the name took its rise. The fourth circle gives the day of the epact, or number of eleven days that is added to every lunar year to make its length correspond with the solar. When the amount of epact days exceeds twenty-nine, as it must do every third year, an intercalation of a lunar month is made, so that at the end of nineteen years the solar and lunar years again commence on the same day, and thus the epactic and lunar cycles coincide. The day of the epact assigns the age of the moon on the 1st of January in each year of the cycle, and this is what the needle indicates. The fifth circle gives the particular year of the current indiction. This is a period of fifteen years, the designation of which is traced back to Constantine and even to Julius Cæsar. The indiction was used by the Roman emperors and tribunals in dating their administrative acts, and is still employed by the Popes in dating their briefs and encyclical letters. All the effects shown upon the five circles of this dial are produced by the No. 5 motor of the clock in the following way. The chief motor itself turns the annual wheel placed behind the dial of the computory, which carries on its axle a spiral or snail, on which rests a lever that is in contact with the detent of the No. 5 motor. The rotation of the wheel, of course, causes the lever to rise gradually, though insensibly, throughout the year, until, when midnight of the 31st December strikes, the lever falls and the detent is set free. No. 5 motor thus comes into action, and by the arrangement of its train, every needle of the computory circles takes the position which it is to occupy during the course of the year then beginning. Thus the movement proceeds from the secondary motor, but it is the chief motor of the whole system which gives the signal, and determines the moment and measure of action.

No. 2 dial of the middle bay is placed directly over the centrical one of the group, and gives the hour of the sidereal day, which is measured by two successive transits of the same star across the meridian. The sidereal day never varies, its length being uniformly of 23 hours, 56 minutes, and 4 seconds. Sidereal time coincides with mean time once only in the course of the year. No. 3 dial gives the solar equation, or the difference existing between mean and true time,—that is, between the ordinary time of any well-regulated watch, and the time of the solar day, as measured by two successive passages of the sun's middle across the meridian. The time of the true solar day agrees with mean time on four days only of the year, the 15th of April, 15th of June, 1st of September, and 24th of December. The real or solar day may be thirty-two minutes longer or shorter than the ordinary day, and the needle of the dial-plate indicates on each successive day the number of minutes which must be added to or retrenched from the twenty-four hours, in order to produce the equation of time. The dial No. 4 indicates the declination of the sun to the north or south quarter of the heavens in its passage across the meridian, the extent of which is measured by an arc of 23 degrees, 27 minutes, and 30 seconds. When the sun is at its apogee of elevation on the 20th and 21st of June, the summer solstice occurs; the winter solstice at its perigee, or opposite extreme point of declension, on the 21st of December. The needle of this dial, traversing an arc of the above extent, shows the sun's northing or southing for every day of the year, and marks the solstices at the two extremities of the arc. Nos. 5 and 6 dials show the length of every day and night in the year at the latitude of Beauvais,—a natural phenomenon depending on the sun's declination. When midnight of each day arrives, as in the other cases, the displacement of the dial-hands is instantaneously effected. No. 7 shows the seasons, the circumference of the dial being divided into four segments, which are in fact segments of the colures, or lines marking the quaternary section of the terrestrial sphere. The needle enters or quits one of these divisions, according as the season indicated begins or ends. No. 8 dial shows the twelve signs of the zodiac, and the time of the sun's entry into each. Nos. 9 and 10, the hour and minute of sunrise and sunset on each successive day; Nos. 11 and 12 the day of the week, and the nominative planet of each day. Regularly at midnight the needle of every dial advances one degree. The main annual wheel of the clock is, of course, that on which all these movements and changes depend, every dial being provided with a subordinate wheel, performing its rotation like the other in a year.

In the left compartment of the front, No. 1 dial does not merely indicate the hours of sunrise and sunset, but represents the phenomena themselves. The circumference of its plate bears a golden coronal, on which are marked the twelve diurnal and twelve nocturnal hours of mean time. This coronal represents the apparent course of the sun, which gravitates round it; and in the centre of the plate, on the blue ground of its surface, is a terrestrial globe fitted with a gold ring that represents the meridian of Beauvais. From this projects a stylus in the plane of the meridian, indicating with its point the intersection of the meridian with the line of the sun's course. The globe has also its horizon, which inclines, as the year progresses and the sun climbs or descends, towards the solstitial points marked by a gold line on the dial-plate, above and below the earth's orb. When the horizontal hand touches the summer solstice, the sun is seen to rise at four o'clock and set at eight; when its other edge declines towards the winter solstice the sun rises at eight and sets at four; when the horizon is parallel with the face of the dial, it marks the equinoxes, and the sun rises at six and sets at six. But this is not all. The sun's place on the dial at noon is exactly over the figure of notation, but if its globe were made to cross the point of the stylus, which is, in fact, the prolongation of the meridian of Beauvais, exactly at that hour, the real time of passage would not be shown, and the indication would be false; so that provision is made for a daily displacement of the earth's globe on the dial, corresponding to the amount of the solar equation, as above explained. Evidently, in inspecting this dial, it is best to neglect the methods of representation, and look only at the indications of phenomena. If the modes are not those of nature, the results at least are perfectly correct as shown. No. 2 is a group of one central dial, and eight minor surrounding it, showing meridian time at Paris, and at eight places situated westwards of it,—London, Amsterdam, Bordeaux, Lisbon, Montreal, New York, Mexico, and Rio Janeiro. Each dial bears the name of the city where meridian time is shown, the longitude being inscribed on the enamelled plate. No. 3 dial gives the quantesimal of the year. The great circle gilding its circumference shows the names of the months, and the proper number of days for each; the date of every day is indicated, with the name of the saint commemorated on each. Leap-years are duly shown, and the artist has even made provision for indicating the secular bissextiles, when the century begins with a leap-year. Three minor dials on the surface of No. 3 show the phases of the moon, its age, and the mean time of its transit over the meridian of Beauvais.

In the right compartment of the front, the first dial shows the movements of the moon, as that of the left showed those of the sun, with similar mechanism. No. 2 also corresponds to No. 2 of the left, being a group of nine dials, the central indicating meridian time at Rome; the eight others meridian time in eight cities situated eastward of Paris,—Berlin, Stockholm, Petersburg, Warsaw, Florence, Vienna, Naples, and Lyons. No. 3 dial presents a calendar of Easter and the movable feasts depending on it for 300 years. On the blue ground of the surface are designed three lesser dials, each fitted with a hole or wicket, respectively showing the year of the world according to the ordinary Mosaic chronology, the millennial number of the current year, stating whether it is leap-year or not; and, lastly, the current century, indicating the secular bissextiles. All these calendary notations remain fixed for the year; but at midnight of the 31st of December, the interior mechanism is set in motion, and the indicators of the movable feasts point to the exact day on which each falls in the ensuing year. To the millennial number of the year a unit is added; if the unit's place had the figure 9, a 0 is substituted for it, and a unit is added to the figures standing in the place of the decimals. The secular number of 19 will, of course, remain unmoved till midnight of the 31st of December, 1899. The same arrangement holds good for the designative word "bissextile," which marks the leap-years, and replaces the word "common" at the instant when the 31st of December of the year or century expires.

We can afford room but for a very brief mention of the dials set in the lateral faces of the clock, which are all occupied by representations of natural phenomena and stellar rotations. No. 1 of the right face shows eclipses of the sun, lunar eclipses not being shown anywhere, because they are visible only at night. No. 2 shows the rise and fall of the tide at St. Michael's Mount, a point of the French coast which is celebrated in history and song. The movable dial-plates are beautifully painted in miniature, by M. Thierrée of Beauvais, and represent the phases of sea and sky in calm and tempest, the tides being ascertained by a knowledge of the exact length of the lunar day. A key to the construction may be thus obtained by such as choose to work out astronomical problems. The movement of the dial-plates is regulated by the seventh motor, which is fitted with the conic pendulum. A small dial at the bottom of the plate carries the tidal time-table, and at midnight of every day, the needles, which are moved by a different motor, No. 16, point to the times of high and low water in the twenty-four hours immediately following. The rise and fall of the tide each fill up, as in nature, two quarters of a lunar day, and the plates also show the changes of the tidal level from day to day, according to the moon's age. Nothing of this kind, we believe, has been attempted by an English artist, since Ferguson's famous clock, which showed lunar movements, with high and low water for every day at London Bridge. This clock, however, had an error of three-quarters of an hour in the lunation, the effect of which was to place the tide three hours wrong at the end of four months. In No. 3 dial the construction is equally complex. The outer plate, which has on its label the notation of the twenty-four hours, acts as a screen to the planisphere placed behind it, and seen through a slit in the plate, which represents the observer's horizon, the meridian of Beauvais being marked by a thread of silk. On the inner plate, which revolves in the time of a sidereal day, appears a chart of the boreal or northern half of the celestial sphere, in which eighty-six constellations, 4,000 stars, and upwards of 500 nebulæ, or clusters of stars, are distinctly delineated and graduated according to their apparent magnitudes. The planisphere carries with it in its revolution a movable belt or band on the outer plate, which fills the narrow space left between the hour-figures and the central screen, and is divided into the months and days of the year. By this arrangement the dial is made to indicate,—1, the aspect of the heavens at every hour and minute of diurnal mean time; 2, the rising, passage across the meridian, and setting of each star; 3, the period of the star's presence or absence on the horizon; 4, the circumpolar stars which are perpetually visible. The planisphere, which is regarded as the *chef d'œuvre* of the clock, is constructed by M. Feuet, one of the most rising astronomers of Paris. The dial No. 1 of the left face consists of a miniature planetary, in which the orbital motions of the seven principal planets are shown, Mercury revolving, agreeably to the calculations of astronomers, in eighty-eight days, and Saturn in twenty-nine years. No. 2 dial corresponds to the same of the right face, and exhibits a sea-scape exquisitely painted, with the rise and fall of the tides, at Montorgueil, in Jersey, a place well known to the visitors of that island for its natural beauties and as the scene of Prynne's imprisonment. No. 3 likewise corresponds to the same of the right, exhibiting a full projection of the austral or southern planisphere. The chime-system of the clock for striking the hours and quarters has its mechanism placed behind the sculptures of the top-front, and is regulated by the second and third motors. The movements of the statuettes and niched figures are regulated with the precision requisite for the *ensemble* of this curious freak of mimetic art, so congenial to the taste of our French friends, by the motors Nos. 4, 9, 11, 12, 13, and 14.

The cost of the whole clock amounted to a sum little less than 100,000*l.*, raised by subscription, the case alone having absorbed 3,500*l.* The whole fabric, consisting of about 1,700 separate pieces, admits of being taken down and put together again, with no more difficulty than is inevitable in such an undertaking. It was removed to Paris, and exhibited in action to the public of the French metropolis, previously to its being set up in the cathedral.

We are of course aware of the objections long entertained by our own clockmakers to complicated horological fabrics, as being overloaded with cumbersome mechanism likely to produce great irregularity of motion in the going train. The plan of the Beauvais clock, however, with its double systems of motorial force, compensation,

and regulation, as sketched above, appears to repose on bases of mechanical power too solid to be easily shaken. At all events, it may be fairly regarded as the greatest curiosity of its age, and as it is, in fact, in itself an epitome of science and art, it well deserves to be called a monumental clock. Its success or failure will be keenly watched by a large class of intelligent and interested observers. If horology be not entitled to be ranked amongst the fine as well as the useful arts, the term "fine arts" has no meaning. Even if it should be proved that this clock is inferior to others of simpler construction in point of extreme accuracy as a chronometer or time-keeper, it would still be admired with as much justice as the works of Raffaelle and Canova, or any other of the great artists of former or present days.

THE TEMPLE OF DIANA AT EPHESUS, AND THE HYPÆTHRON OF THE GREEKS.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

At the ordinary general meeting of this Institute, held on Monday evening last, the 22nd inst., Mr. Charles Barry, president, in the chair, the following gentlemen were balloted for and duly elected, viz.:—As Fellows—Mr. Edward Loochars, of London, and Mr. Alexander William Mills, of Manchester. As Associates—Mr. Charles Taylor, of Merthyr Tydfil, and Mr. George Eastlake Thoms, of Liverpool.

Mr. James Fergusson, F.R.S., then read a paper "On the Temple of Diana at Ephesus, and the Hypæthron of the Greeks." He commenced by observing that in November, 1861, he read a paper before the Institute, in which he was induced to enter into the question of the manner in which the Greek temples were lighted, not being able to believe that so ingenious and artistic a people as the Greeks could possibly have been content with merely opening a hole in the roof through which wind and rain, as well as light, would get into the cella. The cellas of Greek temples were occupied, as was well known, with paintings, sculptures, and works of art of the most delicate kind, and needing protection from the external atmosphere, and on this ground alone it was impossible that the Greeks could have adopted so clumsy a mode of lighting as that referred to. At Agrigentum, in Sicily, light was admitted under the peristyle of the temple, but, in Mr. Fergusson's opinion, the Greeks, as an artistic people, would not open the sides of their walls, but used what were equivalent to skylights, which were capable of being closed by blinds or shutters so as to prevent inconvenience when bad weather prevailed. In defence of the hole-in-the-roof method of lighting, it had been urged that the climate was such that no inconvenience would be felt; but it should not be forgotten that the climate was quasi-tropical, that in summer the heat was very great, while in winter the rain came down in torrents. That the weather in those latitudes was sometimes extremely boisterous was proved by the recent experiences of our fleet in Besika Bay. In point of fact, a mere hole in the roof would be even more objectionable in a building at Athens than in one in this country. He could not flatter himself that his proposals met with much acceptance when brought forward sixteen years ago; but in again reading over, after that interval, the discussion that followed he did not see anything to induce him to alter his views. The late Mr. Ashpitel prepared, in conjunction with Mr. Falkner, a most elaborate reply to his (Mr. Fergusson's) paper, but he could not see that they had hit upon any weak point in it. Since that time the controversy had rested, and nothing had been written on the subject, so far as he knew, except by M. Hittorff, who went largely into the question, and rejected summarily not only his (Mr. Fergusson's) views, but Professor Cockerell's and Mr. Falkner's, propounding two designs of his own which were worse than any that had been brought forward. But, in restoring the temple of Selinus, M. Hittorff adopted a mode of lighting exactly similar to that which he (Mr. Fergusson) had suggested as the mode of lighting adopted for the Parthenon. In regard to the Temple of Diana at Ephesus, he should be obliged to differ considerably on some points with Mr. Wood,—not in regard to his facts, because they were perfect, admitting of no dispute whatever, but with regard to his theories. He said this with the greatest reluctance, because he had the greatest admiration for the zeal and perseverance with which Mr. Wood dug out the temple, and for the accuracy with which he had surveyed it. The discovery of the temple deserved to rank as the most creditable archæological exploration of modern times, on account of the indomitable courage and persistency with which Mr. Wood had pursued his labours during a space of several years before meeting with the object of his search. Layard's discoveries were brilliant, and of immense importance, but it should not be forgotten that almost directly he dug his spade into the ground he (to use an American expression) "struck oil," and was almost daily encouraged by fresh discoveries. Almost the same thing might be said of Schliemann, whose success was only deferred for a year or two. But for eleven long years Mr. Wood was engaged in exploring the site of the Temple of Diana at Ephesus,—for the first half of that period without any success, and even after the temple was found, season after season was passed in merely removing 20 ft. of earth from the site of it, and such perseverance was certainly deserving of the warmest thanks. But when the temple was found, it was (to use a slightly Irish phrase) "gone,"—there was not much of it left, and it was only with great difficulty that it could be (conjecturally) restored. Mr. Fergusson here took occasion to say that it did not necessarily follow that the person who was the best qualified to explore a temple was the one best qualified to "restore" it: generally speaking, the man in the closet, who pored over all the points, was better fitted for that duty. Mr. Wood had, however, undertaken both tasks, and while admitting that the restoration which he gave in his book was a most valuable contribution on the subject, he (Mr. Fergusson) could not see that Mr. Wood had solved all the difficulties. Mr. Fergusson then proceeded to speak of the history of the temple, which, he said, had been thoroughly investigated by Mr. Falkner, and concerning which there was in the present number of the *Edinburgh Review* a very perfect *résumé*. There were eight successive rebuildings or repairs of the temple at Ephesus, of the first five of which we knew nothing. Of the three latter rebuildings Mr. Wood found remains, all on the same site, each temple being practically the same building, rebuilt on the old lines. Of these, three rebuildings may be said to belong to the age of Pericles, and consequently as contemporary with the Parthenon, and therefore would be likely to contain all those refinements of Greek architecture which characterised that building. The last temple was of the age of Alexander the Great, and probably contained all the richness and grandeur which characterised the Mausoleum and other buildings of that date. Before the remains of the temple were dug out by Mr. Wood, the only means we had of knowing what it was like was the short account of it given by Pliny: but now that we know what the temple really was like, it was not at all difficult to understand why nobody in modern times could agree as to its form or decorations, because it was totally unlike any other temple either in Greece or Asia. The first point that Mr. Wood had settled was that the peristyle consisted of 100 columns. A passage in Pliny said there were 127 columns, which were the gifts of so many kings, but Mr. Wood, with Falkner before him, had inserted a comma in reading the passage, making it read to the effect that there were 100 columns, twenty-seven of which were the gifts of kings. Scholars replied that such a method of getting over the difficulty was ridiculous and untenable, because there were no commas in Latin books. However, the spade had decided that there were only 100 columns. The disposal of these columns was also now quite certain,—Mr. Wood's disposal of them was undoubtedly quite correct. One point in which he differed with Mr. Wood in regard to the peristyle was as to the height of the columns. Mr. Wood made the height 55 ft. 8 in., while Pliny states them to have been 60 ft. high. He (Mr. Fergusson) was rather inclined to regard Pliny's measurement as being the correct one, on two grounds. Firstly, when he undertook to restore the Mausoleum at Halicarnassus, he found every one of Pliny's measurements corresponded with the remains found on the spot. Secondly, he was convinced that the pillars were 60 ft. in height, because their height and proportion were nearly the same as those at Didyme. At Didyme the pillars were 6 ft. 3 in. in diameter, and were 63 ft. in height; at Ephesus they were 6 ft. 1 in. in diameter. Another reason why he was convinced that the columns at Ephesus must have been 60 ft. in height, was that in looking at the elevation in Mr. Wood's restoration, the façade would seem to have the defect of *lowness*, which an extra 5 ft. in the height of the columns would get rid of. As to the use of the hypæthron, he believed that when the Greeks used it they did not cut holes anywhere in the roof; they must have made it symmetrical, and to correspond with the pillars outside. Then came the question as to whether the Greeks cut nicks in the roof; his (Mr. Fergusson's) opinion was that they did not, but that the hypæthron showed above the roof. He was strengthened in this opinion by the fact that in the fifth volume of Stuart's "Athens" a sarcophagus is represented with a cover imitating a simple roof, with just such a projection above the roof; others similar were found at Cyrene and elsewhere, all showing the mode in which he assumed the Greeks employed the hypæthron in lighting their temples. This arrangement was distinct and symmetrical, and must have accorded with the external columns. Assuming this to be so, the light could then be introduced into the cella of the temple by windows in the transverse walls so provided, and these, again, could be closed, or protected by curtains or shutters, so as to protect the interior effectually from the weather. If such an arrangement prevailed. Mr. Fergusson said he had no doubt that the window-opening was closed with ornamental bronze grilles or gratings. Mr. Wood had found during his excavations what he called an "oval capital"; but it was not strictly an oval capital, it was rather the capital which had surmounted two half-columns with a square pilaster between. This pilaster was a feature which could not be used, so far as Mr. Fergusson could see, in any restoration of the temple unless on the hypæthral theory. The diameter of the pillar was 25 in., which would give an order of 27 ft. in height, which, with Mr. Wood's Ionic order, would make up 70 ft., the width of the cella, and a very probable proportion. With regard to the semi-circular form which Mr. Fergusson proposed for the roof of the cella, he would refer those who wanted to go further into the question to Falkner's "Dædalus," wherein were depicted four coins representing sections of temples, and from which Falkner argued that the temples of the Greeks were covered by semicircular roofs, and applied that principle of roofing to the Parthenon, although, in Mr. Fergusson's opinion, such a mode of roofing was not applicable to that building. Nevertheless, he thought Falkner made out a good case as to the probability of its having been employed in some of the temples of Asia. At Nineveh and Khorsabadd arched forms were common enough,—gateways were arched, and nothing was more probable than that in Ionia and Asia Minor circular forms should have been employed. Such a wooden vault as that which he conceived must have been employed in connexion with the hypæthron at Ephesus must have been very pleasing. As to the *columnæ cælatæ*, or sculptured columns, they were thirty-six in number, the sculpture extending to the height of about 6 ft., and the bases being very elaborate. In regard to the remains which Mr. Wood had found of these columnæ cælatæ, one difficulty which presented itself was that while the drum in most cases was 6 ft. 1 in. in diameter (which was the diameter of the pillars generally, there being, therefore, no doubt that they were of the lower drums), there was another drum which was only 5 ft. 6 in. in diameter, and which, of course, could not be regarded as one of the lower drums. Mr. Wood had suggested that the sculptured drums of the columns were three stories or stages in height, because at 25 ft. from the floor the columns attained a diameter of 5 ft. 6 in. But since the marbles had been sent home and placed in the British Museum, there were some six or seven blocks which were found to contain sculpture to the same height as that on the drums; but as these blocks were square, Mr. Wood had assumed that they were parts of the great frieze of the temple. When Mr. Fergusson saw them he thought they were the sculptured drums of the antæ, and he came to the conclusion that as there were five angle-pieces found they could not have belonged to the frieze. Mr. Newton, however, pointed out to him that on the top of each of three of these blocks was a circular mark showing a base of 6 ft. 6 in., and it thus became evident that they were cubical bases upon which the upper smaller blocks of the columnæ cælatæ were placed. But a difficulty in the way of accepting this ex-

planation was that they could not have had the same base repeated above, for it would be almost indispensable that the columnæ cælatæ could range with those on either side. Mr. Fergusson suggested that there were two of these sculptured columns between the antæ at each end, and two in front. The arrangement at the sides was doubtful to some extent, but at each end there certainly were eight. The lines of the hypæthron were also brought down and marked, in all probability, by columnæ cælatæ, which was eminently an artistic and proper arrangement. But due allowance being made for the magnificence of the columnæ cælatæ, it was difficult to believe that without possessing some other special feature the temple could have been so enthusiastically spoken of by the ancients as one of the seven wonders of the world. It was the smallest of the six great temples of which we knew anything, as the following list of dimensions would show :—

Temple of Juno at Samos...	360 ft.	long,	168 ft.	broad.
„ Agrigentum.....	360	„	173	„
„ Selinus	358	„	165	„
„ Didyme.....	355	„	163	„
„ Athens	354	„	171	„
„ Ephesus.....	342	„	163	„

He was strongly inclined to the opinion that the temple owed a great deal of its magnificence to its base. It was found to be raised upon a stylobate, about 10 ft. high. Pliny gave the dimensions of what he called the *universum templum*, 220 Greek feet, by 425. Mr. Watkiss Lloyd, in taking the dimensions, found that the ratios between Pliny's dimensions and those given by Mr. Wood were nearly exact; he found out that, by adding 7·6 ft. to each dimension of the peristyle from Mr. Wood's dimensions, he got a complete double-square. Working the other way, from the outside, he deducted 8 ft. from Mr. Wood's dimensions, and got a ratio of nine to five,—a very favourite ratio with the Greeks. Mr. Watkiss Lloyd's calculations had shown that Mr. Wood's measurements were as exact as they could possibly be, while at the same time they completely confirmed Pliny's measurements, and proved that his "*universum templum*" was a terrace-wall 8 ft. within the basement-stones which Mr. Wood had found. Mr. Fergusson went on to say that if he were restoring the temple he should be obliged to choose one ratio or the other, and to show how the terraces were adorned by statuary. If the Greeks worked up to a ratio of two squares they must have marked it in some way. Probably it was done by means of a bronze railing, which, as it would have been designed by a Greek architect and adorned with sculpture, gilding would very easily have constituted a feature helping at least to render the temple one of the most highly ornamented buildings in the world. As to the temple at Didyme, Mr. Fergusson went on to show that much ingenuity had been devoted to attempts to show that Greek temples were not roofed, but were open to the atmosphere, because in this temple no floor was found; the explorers dug down to the virgin soil without finding any trace of a floor; they found, however, a flight of steps leading down to the level of the ground outside. They assumed that the peristyle and pronaos were built merely as an approach to the sacred grove; but Mr. Fergusson said his reading of the riddle was that when the temple had been carried up to the full height of the external walls the builders found they could not roof it, and Strabo's account completely confirmed him in that supposition :—"On account of its vastness it remains without a roof, and there now exist, inside and outside, precious groves and other fanes to contain the oracle and the sacred things." It was evident, however, that had the carpentry of the Greeks enabled them to roof this temple, the mode of lighting it would have been hypæthral. There were still two temples of the Greeks which had not been explored,—that of Jupiter Olympias at Athens, and the one at Samos. Excavations would probably show where the transverse walls came and would thus throw some light on the question of the hypæthron. We knew sufficient of the cella of the Parthenon to be able to say that the hypæthral system of lighting just described could not be applied to it, and this would apply to all hexastyle and the smaller Doric temples. Mr. Fergusson, in conclusion, said that from all his researches he was confident that there was no single instance in which a Greek temple was not lighted by perpendicular vertical lights, and that in no single instance were horizontal lights used. And so far as he knew, all the Roman temples, with the single exception of the Pantheon, were lighted in the same manner.

[For the foregoing abstract of Mr. Fergusson's interesting paper we have had to depend on our reporter's shorthand notes, which Mr. Fergusson has kindly revised. To accurately take a full note of a paper on such a subject, when the author's remarks are interspersed with explanatory references to drawings and diagrams, is an exceedingly difficult, if not an altogether impossible, task. But the management of the Institute seems to make it a matter of policy to hinder, rather than to facilitate, the reporting of its proceedings by the professional press. Formerly our reporter was allowed the use of a copy of the paper read. Recently, however, the order went forth that in future no reporter was to be so favoured,—so-called "abstracts" being provided by the secretary instead. These abstracts, when supplied, were of the most meagre character, but latterly even these have not been "prepared." We shall next week give a report of the discussion which followed Mr. Fergusson's paper.]

THE RAILWAYS OF THE BRITISH EMPIRE.

THE last general report of Captain Tyler on the railways, issued within the last few weeks, contains several features of special interest, inasmuch as it is the first report of the kind presented by that officer which deals in detail with the railways in British possessions as well as with those in the United Kingdom. In the present document Captain Tyler shows the actual mileage of railways open in each of our colonies down to the time when the report was made up, as well as lines in progress and projected, in addition to the information which he supplies in respect of railways within the United Kingdom, the result being that he is enabled to lay before the public the entire mileage of railways in the whole British Empire, and also to point out the progress of railway construction in every colony and possession under British rule.

The report is made up to the 31st of December, 1875, and states that at that time the total length of railways open for traffic in the United Kingdom was 16,658 miles, of which 8,898 miles were laid with two or more lines, and 7,760 miles with a single line of rails. The total number of miles was made up as follows, viz. :—In England, 11,789 miles; Scotland, 2,721 miles; Ireland, 2,148 miles. In the year 1875 there was an increase of 209 miles, viz., 169 miles in England, 21 miles in Scotland, and 21 miles in Ireland. He observes that much has yet to be done in the making of still further new lines both in England, Scotland, and Ireland, and that whilst in six years, from 1870 to 1875, 1,513 miles of new lines were opened, the applications to Parliament during the same period were for 6,080 miles, of which 2,500 miles were sanctioned. Additional lines were being laid down on the busiest portions of existing railways, whilst some of the lines which had been partly constructed and temporarily abandoned would be recommenced, and new or widened lines become, as traffic continually increased, more and more necessary for separating, on through routes, the fast and the slow traffic from each other. The total capital expended on these railways in the United Kingdom down to the end of 1875, was 630,223,494*l.*, of which 20,327,563*l.* were spent in 1875. The returns showed that the average cost of railways per mile was annually increasing. In 1858 the cost was a little above 34,000*l.* per mile, whilst at the close of last year it was 37,833*l.* per mile. The total receipts from railway traffic in 1875 amounted to 58,982,753*l.*, on the 16,658 miles open, as against 56,899,498*l.* on 16,449 miles open in 1874. The expenses were 32,198,196*l.* in 1875, and 31,647,517*l.* in 1874. The total number of passenger journeys in 1875 was 506,975,234, exclusive of the journeys of 597,257 season and periodical ticket-holders. The locomotive engines employed on the railways of the United Kingdom in 1875 were 12,439, and the number of vehicles, exclusive of locomotives, was 393,799, as against 289,994 in 1870, showing an increase of more than 100,000 vehicles within the six years. The returns, however, do not represent the whole of the rolling stock at work on the several lines, as they do not include the locomotive engines and vehicles used on the lines, belonging to private owners and companies.

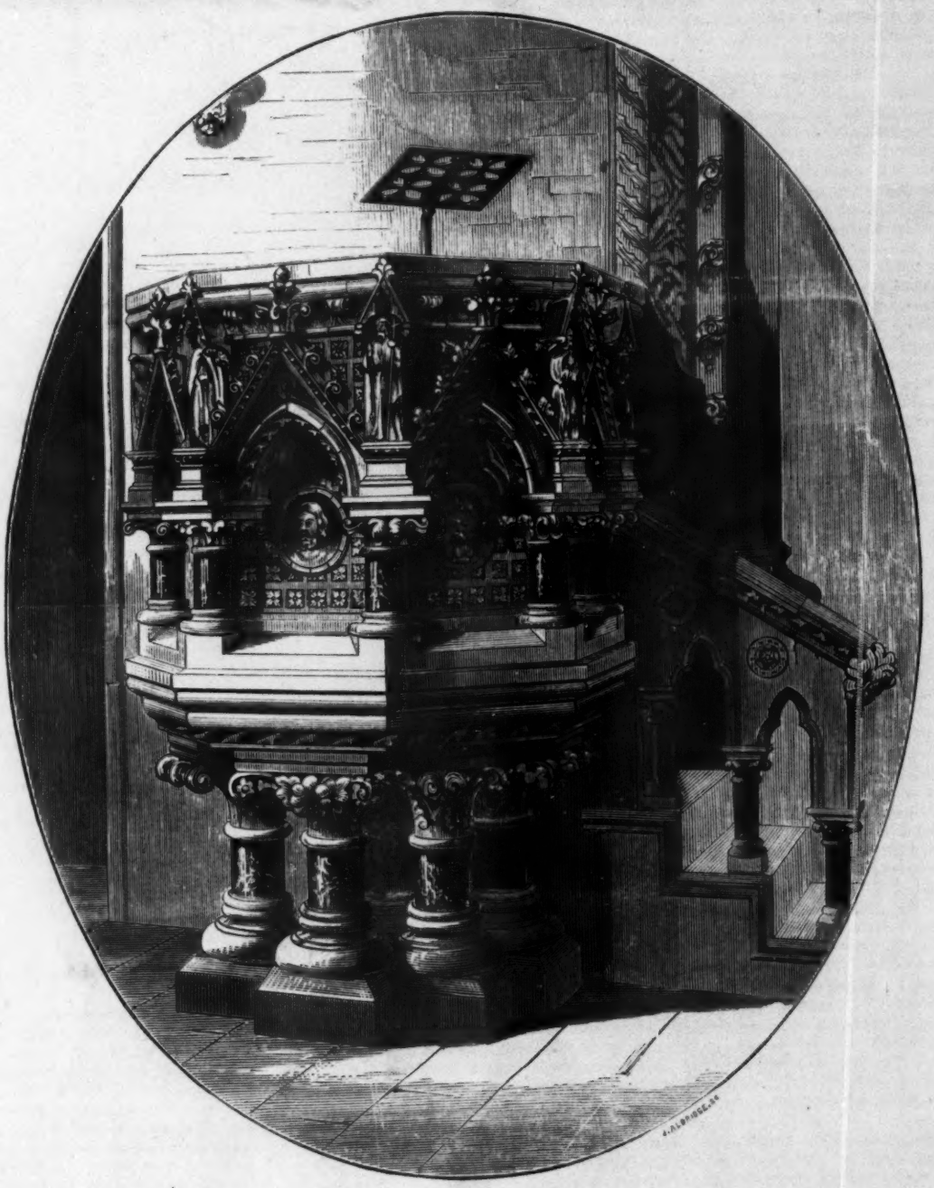
We now come to that part of the report relating to railways in British possessions, in reference to which Captain Tyler remarks that last year, at his request, the Board of Trade communicated with the Colonial Office with the view of obtaining information from various parts of the empire as to the construction and working of railways, and the prospects of their extension, to the end of 1875. He observes that this being the first occasion on which an account of the railways of the empire has been compiled, he has entered into more minute details than will be required in future reports. After stating that the particulars have been obtained from the commissioners and engineers of the several Colonial lines, he proceeds to give the number and mileage of the various railways in the different Colonies, from which we make the following summary :—

New South Wales :—At the end of 1875, railways open, 437 miles; in course of construction, 257 miles. Queensland, lines open, 263 miles; in course of construction, 258 miles. South Australia, open, 258 miles; constructing, 103 miles. Victoria, open, 618 miles, of which 569 miles belong to the Colonial Government. West Australia presents an exceptional position to most of the other colonies, the report stating that at the end of 1875 there were no lines open, but that three lines were projected, and one was in course of construction, which when completed would be 34 miles long. British Guiana, open, 21 miles. Cape of Good Hope, open, 149 miles, the whole working by the Colonial Government; 108 miles in course of construction, and in addition 188 miles determined upon for the western district, and 388 miles for the eastern district. Ceylon, open, 91½ miles, all the property of the Government, and surveys made for 126 miles of new lines. Natal, open, 5½ miles only, but in addition 119 miles of new lines determined upon. The report states that Natal is much in need of railways, and that there is every probability that in a few years it will possess a system of railways which will exercise a beneficial influence upon its commerce and industries. Jamaica, open, 25 miles. Mauritius, open, 66 miles. Tasmania, open, 167 miles. New Zealand, open, 542 miles; 463 miles under construction; and 220 miles determined upon, but not yet commenced. The report adds that the greatest portion of the lines are of Government construction. Dominion of Canada, 4,443 miles open, in addition to 343 miles in the United States belonging to the Dominion. The report gives the rolling stock on the Canadian lines as 971 locomotive engines, 986 passenger vehicles, and 1,050 coal and ore wagons. India, open, 6,461 miles, exclusive of sidings. There are 5,710 miles of guaranteed railways, and 751 miles of State lines. The total expenditure on State lines to December, 1875, was 12,070,185*l.*, and on guaranteed lines, 93,720,794*l.* The net revenue on the Indian lines for the year 1875 amounted to 3,627,194*l.*, the profit on the guaranteed lines being 3,555,840*l.*, and on the State lines 397*l.*, 302*l.*, and 95*l.* respectively.

The general summary is that at the end of 1875, as stated by the report, there were 16,658 miles of railway open in the United Kingdom, and 13,547 miles in British possessions, making a total in the British empire of 30,205 miles.

The report enters at great length into a detailed description of the several colonial and Indian railways, enlarging on their construction in respect of bridges, viaducts, embankments, tunnels, stations, and other buildings, together with materials of construction.

An Architect summoned for Breach of Building Bye-Laws.—At Durham, on the 6th inst., Mr. John Fox, architect, was summoned by the Durham Rural Sanitary Authority for a breach of the bye-laws in building a wall behind his house in New-street, Durham, thereby forming a certain street of a less width than 18 ft. It appeared that in the early part of last year the defendant sent in a plan for the erection of five houses in the street in question, but the plan was rejected because there was not sufficient space between the back of the houses and those opposite. The defendant, however, went on with the houses, and in October last commenced to build a brick wall behind them which was only 12 ft. from the property on the other side. The defendant refused to remove the wall, and hence the present proceeding. In defence it was shown that the street in question was laid out in building sites some years before the passing of the Sanitary Bye-laws, which only came into operation in January, 1876. Under these circumstances the Bench dismissed the case.



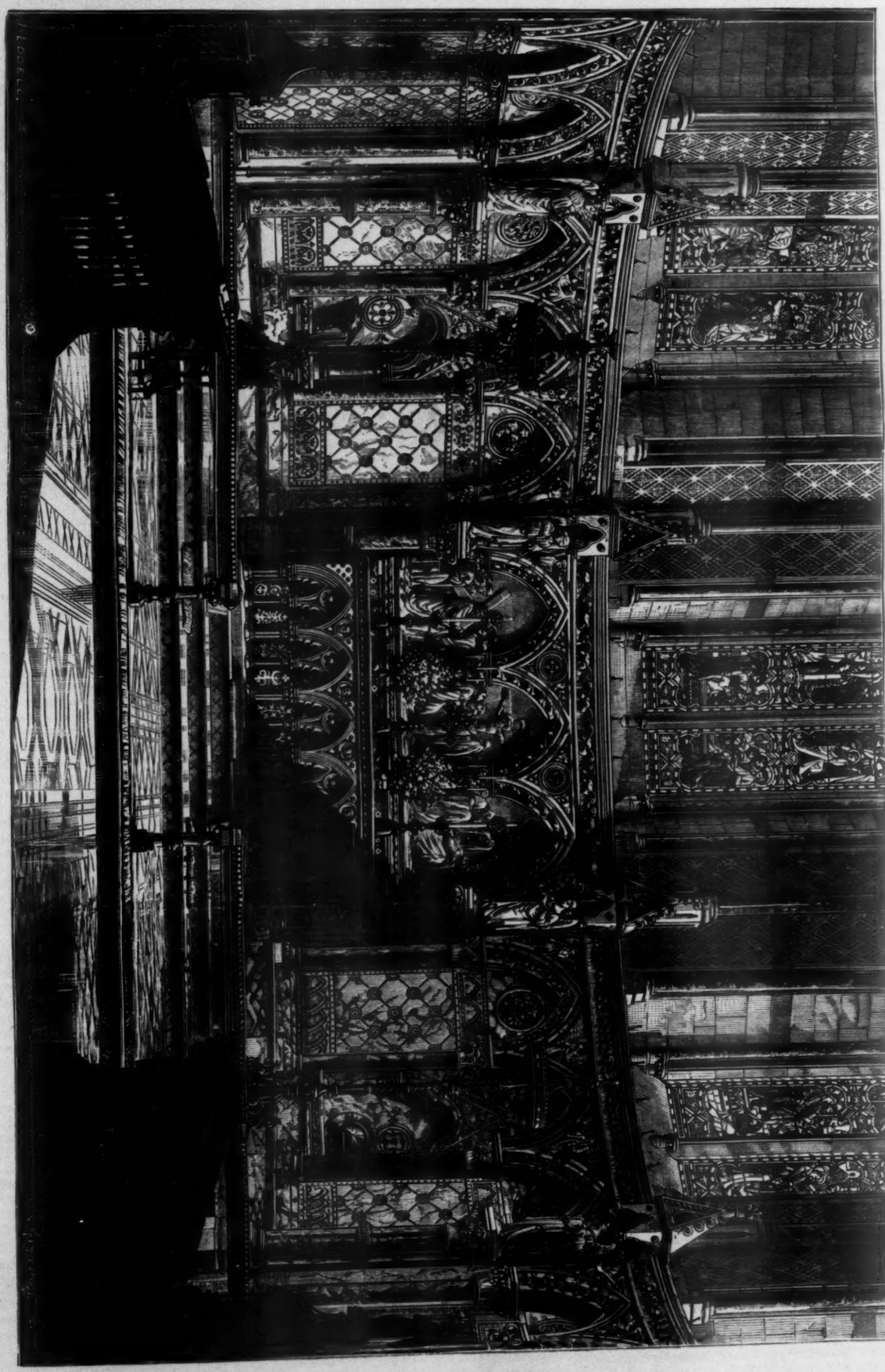
ALL SAINTS' CHURCH, CHELTENHAM: PULPIT.

ALL SAINTS' CHURCH, CHELTENHAM.

THE reredos of this church has lately been completed from the designs of Mr. J. Middleton, architect, of Cheltenham, and the work has been executed by Mr. Boulton, carver, of the same place. The reredos runs round the east end of the chancel, and is divided into five compartments, each compartment consisting of three arches. The divisions are marked by angels, 2 ft. 6 in. high, standing under canopies, above which rise marble pillars which are carried up to support the groining of the chancel. Of these angels some are holding symbols of the "Passion" while others have their hands joined in an attitude of prayer. Smaller angels playing on musical instruments occupy the spandrels. The plinth and pillars are of English, Irish, and Italian marble, the larger angels of Caen stone, and the rest of the work is of alabaster. The three centre compartments, forming the reredos proper, contain representations in relief of our "Lord bearing His Cross," the "Crucifixion," and the "Entombment," the other arches being filled in with incised work of black cement on an alabaster ground.

The pulpit is constructed of materials similar to those used in the reredos. The figures at the angles represent Noah, Joseph, Elijah, St. John Baptist, St. Chrysostom, and St. Augustine, the heads in the medallions being those of our Lord and the evangelists.

The dimensions of the chancel are 45 ft. by 25 ft.; those of the nave and aisles being 93 ft. by 56 ft. 2 in., internal measurement.



ALL SAINTS' CHURCH, CHELTENHAM: REREDOS.—MR. MIDDLETON, ARCHITECT.

THE METROPOLITAN BOARD'S "PLANS AND SECTIONS" OF PROPOSED STREET IMPROVEMENTS, 1877.

ON examining the plans of the Metropolitan Board's proposed grand scheme of further street improvements which accompany the notices deposited (in compliance with Standing Orders) at the vestry offices of the districts immediately affected by the proposed works, preparatory to Parliamentary sanction being applied for in the approaching session (1877), I observe that one of the three principal divisions of the scheme (section 3) adopts in its entirety a scheme that was projected sixteen years ago, and of which you then published a paper at my hands detailing the circumstances attending that movement, and in illustration of the design you appended a map engraved to the size of your page from the original drawing.* On comparing this map and matter with the Board's sheet, showing section 3, the identity, even to the minutest details, will be at once perceived, and leaving it pretty clear that in the preparation of this section of the Metropolitan Board's published scheme the *Builder* has been the instructor; for the proceedings in that affair were entirely unconnected with that Board; and therefore to the promoters of this former scheme—whose names will hereafter be referred to—I suggest the merit of the projection is in fairness due.

The following little history of the affair referred to, epitomised from the *Builder* article, you, Mr. Editor, may think worthy of here appending. When the Charing-cross Terminus was being established, the Terminus Company, in their prospectus, gave out the declaration of it having been carefully estimated that from 6,000,000 to 7,000,000 persons per year would pass through its portal, thus giving on an average, say 20,000 for every day. And as a large portion of the persons—either in the ingress or egress—would be conveyed in vehicles of some kind, it was generally thought that the Cross traffic, and occurring in rushes at intervals, would render the ordinary passage of the Strand at this part difficult and dangerous. Communications in reference to this matter having passed between the vestries of St. Martin's-in-the-Fields and St. James's, Westminster, each vestry appointed delegates to meet and confer together with a view of seeing if any practical measure for ameliorating the anticipated evil could be devised. The burden of the delegation, however, merged mainly into the hands of Mr. Henry Bidgood and myself, of St. James's, and Mr. Dalton, of St. Martin's, with Mr. Dangerfield, vestry clerk of the latter.

It so happened that at that time the inadequacy of the National Gallery buildings, for its greatly increased and rapidly increasing requirements, was engaging the attention of the Government and Parliament.

The vote of the House of Commons of 1856, conclusively rejecting the proposition to remove the National Gallery to South Kensington, together with the report of the Royal Commission of the next year approving and recommending the Gallery staying at Charing-cross, and its accommodation enlarged, as also the tenour of the several discussions on the subject in the House of Commons, sufficiently justified the conclusion that a new grand edifice was to be erected here, or the existing structure enlarged by new buildings in the rear, in either case, on ground to be acquired for the purpose by the buying up of the St. Martin's Workhouse, and the removal elsewhere of the St. George's Barracks. Now, the narrow thoroughfare of Hemming's-row, abutting on the workhouse to its full length, and the similar thoroughfare, Orange-street, in like manner on the barrack-yard, and these two streets being in line with the newly-made thoroughfare of King William-street, carrying the line straight into the Strand, suggested the idea of a readily, and comparatively cheaply practicable, grand public improvement, by the creating of a new length of street to continue Piccadilly in uniform width of way direct to mid-Strand, making Hemming's-row and Orange-street to constitute part of the line by their being made out to the required width by the frontage of the new edifice being kept back. It was thought that the body to whom would be confided the directing of the building of the National Gallery, would,—seeing that by it the new edifice would be given position on a main arterial thoroughfare,—be induced to concur in the scheme, and readily give up, in exchange for that important advantage, the 30 ft. or 40 ft. wide strip of land requisite for the necessary widening of the roadway in that part, and thus, inclusive of King William-street, already in existence, about two-thirds of the entire length of the new street would be provided, as it were, ready-made, and without cost. The remaining third of the line to be provided by utilising Coventry-street, widened out on its south side some 30 ft., and a short length of Prince-street (about 200 ft.) also widened out; then, by a short cutting driven diagonally through the small block of buildings (bounded by Spur-street, St. Martin's-street, Whitcomb-street, and Blue Cross-street), and through the Orange-street Chapel to a junction with the Hemming's-row line.

It should be here remarked that, at this part, there occurs a little deviation from the straight line of the designed new street. Thus: the run of the Piccadilly and Coventry-street line, and the run of the Orange-street and Hemming's-row line not being in direct line, but running in parallel course, with about 250 ft. of separation, similar to the case of lower and upper Regent-street, the new piece of street forming the junction of the two lines, is designed to take the segment form after the manner of the Quadrant. The last remark, as well as the following short summary of the various points of public improvement set forth at the period referred to as consequent on the specified works being carried out, apply in like force as respects the design now put forth by the Metropolitan Board,—viz.: 1st. Important improvement in the City approach from the west by the creation of a section of a commodious new street half a mile in length, and shortening of the way (as against the usual devious route of Trafalgar-square) by upwards of an eighth of a mile; also the avoidance of the long steep gradient of (lower) Regent-street (1 ft. in 30 ft., through a run of upwards of 1,000 ft.). 2ndly. Relief to the difficulty at West Strand by the eventual drawing off from that part of all the western through traffic. 3rdly. The doing away with the very ugly and extremely inconvenient sharp twist in the divergence of the Cranbourne-street line at New Coventry-street. 4thly. The increasing of the accessibility of the National Gallery.

The several conferences held in respect to this scheme, with her Majesty's Board of Works—the department to which at that period Metropolitan Public Improvements pertained—were satisfactorily welcomed. The honorary promoters were assured by the then Chief Commissioner (the Hon. W. F. Cowper) that the idea should be prominently brought under notice during the succeeding recess, when the Government would most certainly have under its consideration the whole matter of the National Gallery, and when the future action of the Government in respect thereto would assuredly be determined on; intimating also at the same time that he should be prepared to recommend that the expense of the new street part of the business should be made a charge on the London Bridge Approaches fund (coal and wine dues), on which account,—it was understood,—a balance was accruing sufficient for the purpose.

But the Government efforts to bring about the erection of a new National Gallery edifice—or such an enlargement at once of the existing structure as would engage the site of both workhouse and barracks—becoming frustrated by the difficulty found on the money question in the House of Commons, as also by the persistent refusal of the War authorities to allow of any interference with the St. George's Barracks; and the new street scheme (in so far as related to the thing as a joint work), not being applicable in the circumstances of the piecemeal enlargement of the building which became adopted instead, the project fell through.

It is, however, a point of satisfaction to me, and doubtless so also to my fellow honorary workers on the occasion, that now, after sixteen years, we see our project being officially taken up, and in its precise original state put forward as one to be immediately carried out.

And, furthermore, I would observe that as respects Section No. 6 of the Metropolitan Board's great scheme, this is also a revival of part of an abortive effort at street improvement of seven years ago, in which Mr. Henry Bidgood, as its original projector, and myself were prominently engaged. This division of that unsuccessful projection,—which had for its object the opening out of a more direct communication between the north and south parts of the metropolis, *viâ* Charing-cross,—was also aimed to be carried out in conjunction with another proposed kindred undertaking, viz., the construction of an underground railway intended to connect the Euston-square and Midland termini with the terminus at Charing-cross, of which project Mr. J. Wolfe Barry was engineer, and Mr. Toogood Parliamentary agent; and of which the *Builder* published a paper, also at my hands, detailing all the circumstances of the joint scheme, together with an illustrating map.* The street communication improvement projection was to be effected by the formation of a new 60 ft. wide street in continuation of Tottenham Court-road, planned to strike straight through Soho to Leicester-square, crossing the area of that square (the spot at that period an unsightly waste), then dropping down by the line of St. Martin's-street, and skirting the western flank of the National Gallery, and passing to the junction with the Whitehall line by way of the western side of Trafalgar-square and Charing-cross. The construction partnership applied only to the piece of the line from Tottenham Court-road to Leicester-square, and the conditions arranged were that the Railway Company were to buy up the properties and construct their railway, and make good the surface above it for completing the roadway of the new street, and the Metropolitan Board to contribute the fair proportionate quota towards the outlay on the land purchases, and to which that Board ultimately assented, and voted a provisional contribution. But after getting their Act, the railway promoters,—the difficulties of their position being greatly augmented at that critical juncture by the lamented decease of Mr. Toogood, the chief of the movement,—being unable to complete the formation and settlement of the proprietary, the project collapsed; and with it also went the new street project.

The Metropolitan Board's present plan for this No. 6 section of their proposed great scheme of street improvements seeks to effect the like object as was the intent of our "1870" projection, only by a slightly different route,—the change probably necessitated by Mr. Grant's works in Leicester-square. Its route from the starting-point at Oxford-street runs to the length of Crown-street, as in the "1870" plan. Thence diverging a little eastward and taking its course through that miserable quarter of Soho which lies immediately in the rear of the east side of Grafton-street and Little Newport-street; then, proceeding on, strikes Hemming's-row alongside of the new Provident Bank building, rounds the eastern end of the National Gallery by St. Martin's-place, and thence passing by the eastern side of Trafalgar-square and Charing-cross to its proposed junction with Whitehall.

One further notice! The Leicester-square route (the Bidgood line) embraced a provision which in the instance of the Board's planned line does not, of course, occur, and this a provision (having regard to the safe-keeping of the Nation's priceless treasures which that building holds) of no slight importance, as by it the National Gallery became positioned on a wide open street, instead of as now abutting on houses of a densely-populated quarter, and occasioning the risk, perpetually, of fire being communicated from that direction. And at the time of the agitation of this scheme it was confidently expected that, in consideration of so important an acquisition as the National Gallery being by the work given isolation in the now only part of the building not isolated, a fair contribution by the State in aid of the making of that part of the new street would be forthcoming.

FREDERICK CRANE,
Churchwarden, St. James's, Westminster.

* See the *Builder* for 1861, pp. 54, 55, 56.

BRITISH COMMISSIONERS FOR PARIS EXHIBITION.

THE Royal Commission appointing Commissioners for the Paris Exhibition of 1878 has been published. Strange to say that, although the President of the Institution of Civil Engineers, the President of the Water-Colour Society, and the President of the Agricultural Engineers' Association, are named members of the Commission, the President of the Royal Institute of British Architects is not included, nor is there a single architect in the list.

We are glad to see that Mr. P. Cunliffe Owen, C.B., is appointed secretary to the Commission.

Royal Academy.—We are informed that at a general assembly held on Wednesday Messrs. Walter W. Ouless, Peter Graham, and Marcus Stone were elected associates.

* See the *Builder*, March 18, 1871, pp. 203, 204, 205.

RESTORATION OF THE TUILERIES.

THE commission which in August last was appointed to consider the condition of the Tuileries, that had remained in ruins since the sad days of the Commune, have now determined on how to treat the remaining parts of a building so famous in the history of the last three centuries.

So carefully-selected a commission would not be likely to overlook the existing beauty of the object they were called upon to consider, and without encouraging the suggestion to reconstruct the whole building from the plans of Philibert Delorme, which are known still to exist in the national archives, and which would involve the serious task of reforming what may be regarded in Paris in the present day as the anachronism of a palace, they have leant throughout their consultations to the hope of preserving all that is worthy of being preserved, and confining themselves to the removal of the evidences of the injuries of 1871.

The commission, which had, at its meeting of the 14th of August last, confided to an under-commission, composed of Messrs. Krantz, Reynaud, Duc, and Viollet-le-Duc, the preparatory studies for the decision to be come to, have considered the report of this under-commission. Acting on this, the commission is of opinion :—

1st. That that portion of the Tuileries still standing ought to be preserved and restored.

2ndly. That the commission ought to confine itself to the execution of the works named hereafter: The consolidation and restoration of the exterior walls and partition walls judged necessary for the stability of the edifice; re-establishment of the roof, disposing it in the way most favourable for the new destination of the edifice, and restoration of all the exterior joinery; suppression of the walls raised above the porticoes; re-establishment of the terraces; application of a lateral façade to each of the extreme pavilions; establishment of a regular garden in form of a *parterre* round the building.

3rdly. That these works should be executed in the spirit, and according to the directions recommended in the course of the report, and that such an activity should be impressed on them that their completion for the 1st of May, 1878, can be hoped for.

4thly. That the restored palace should be transformed into an art-museum.

The commission invites the Minister (of Public Works) to prepare a scheme as promptly as possible in the sense that has just been indicated.

These conclusions were unanimously adopted, and consequently the Minister of Public Works intends, after having consulted the Council of Ministers, to lay before the Senate, which has taken the initiative in the question, a scheme, the dispositions of which will be conformable to the resolutions of the Commission of the Senate, and of the extra-Parliamentary Commission.

This latter has to decide all the questions relative to the interior arrangements. It has been decided that the administration should prepare the plans and figures necessary for the execution of the exterior and interior reparations, and that these plans, after having been examined by the under-commission, should be eventually submitted to the commission.

When the Palace of the Tuileries is restored, the Parisians will have additional reason to be proud of its new beauty, for it will occupy one side of that already pleasant thoroughfare between the Pont Royal and the Place de Rivoli, which it is proposed to continue through the rue St. Honoré, demolishing the houses round St. Roch, leaving it in a piazza of its own, and continuing the rue des Pyramides with arcades on each side until it reaches the new Avenue from the Opera House, the corner of which and the rue St. Roch they have already commenced to reconstruct.

The entrance to the Tuileries Gardens will, of course, be enlarged opposite the Place de Rivoli, giving a better position to M. Fressayet's statue of Joan of Arc, which, however, there is some talk of removing, the call for which is much less required than that of the two stumpy sphinxes at the gate on the Quai des Tuileries. These monsters are executed in the true spirit of New Road sculpture,—a spirit so rarely to be met with in the work of French artists. The fabulous animals in this case serve as a terrible set-off to the noble bronze lions which stand within so short a distance of them. If these ill-formed monsters could only be animated by the intelligence of their ancestress they would very soon, with praiseworthy mortification, destroy each other.

TEREDO AND TEREBRANS: THEIR RAVAGES ON TIMBER. THE "BEERISING" PROCESS.

CIVIL AND MECHANICAL ENGINEERS' SOCIETY.

AT the ordinary fortnightly meeting of this Society, held on the 18th inst., in the rooms of the Iron and Steel Institute, Westminster Chambers, the president, Mr. R. M. Bancroft, in the chair,—Mr. W. J. Brain read a paper on "Teredo and Terebrans: their Ravages on Timber." The following is a brief abstract :—

Teredo Navalis.—This very destructive sea worm is of an elongated shape, the large anterior part of which constitutes the boring apparatus, and contains the organs of digestion. The tail portion is armed at its extremity with two shells, and has projecting from it a pair of tubular organs, through which the water enters for the purpose of respiration. The manner in which it appears to perforate the wood is by a rotary motion of the foot carrying round the two shells, and thus making them act as an auger, which is kept in connexion with the wood by the strong adherence of the foot. The teredo lines the passage in the wood by a hard shell. This shell is formed around, but does not adhere to the body; it is secreted by the external covering, which, in its first formation, is extremely fragile, but becomes hardened by contact with the water, and adheres to the wood. The interior of this shell is not filled by the body of the teredo, but a large space around is occupied by water, admitted through the small orifice in the surface of the timber, and through which the animal first entered. The author mentioned that, some years ago, when engaged in Cornwall under the late Mr. Brunel, he had, in the course of his duties, to select suitable timber for the engineering works then in operation. This timber was all American pine, and varied from 12 in. to 16 in. square. He had every opportunity of inspecting it, and pieces taken from the raft apparently sound, after going through the ordeal of the circular saw, came out quite eaten away in the inside. At first sight there appeared nothing to guide one in selecting the timber, but upon close examination there could be perceived a small mark on the outside of the log similar to a burn with a red-hot iron, where the worm had made its entrance. Sir Isambard Brunel is said to have taken his idea of the Thames Tunnel from carefully studying the action of this animal. Professor Owen suggests that the power of the Teredo to bore into wood depends upon muscular friction. Professor Forbes, Dr. Carpenter, and Dr. Lyon Playfair could not arrive at any definite conclusion as to whether the boring action of the teredo was mechanical or chemical. Dr. Desbayes made careful investigation at Algiers and Mr. Thompson at the Portpatrick Pier, Belfast, and both came to the conclusion that the borings were made by an acid secretion; but the general opinion is that the boring action is mechanical: this was the author's opinion, after some thirty years of experience in timber piling and marine work of almost every description. The author cited a case of a fir pile taken from the pier-head at Southend, in which one of these worms was found 2 ft. long and ¾ in. in diameter; no doubt this worm had grown to this large size by having fir timber to feed upon, the wood being soft and porous. There were numerous instances of the teredo attacking keels of ships made of oak and perforating them completely. The author referred also to a sample of the pier at Yarmouth which was so honeycombed by the teredo that it could be crushed between the hands as if it were paper.

Limnoria Terebrans.—This enemy to marine constructions in timber resembles a wood-louse, and is so small as hardly to be perceptible in the timber it attacks, being almost of the same colour. It is scarcely larger than a grain of rice, but it is a terrible pest. It works with great energy, and the vast numbers quite compensate for their small size, for as many as 20,000 will appear on the surface of a piece of pile 12 in. square. It proceeds in a very methodical manner, and makes its way obliquely inward, unless it meets with a knot, when it passes round the obstacle, and resumes its former direction. The surface of the timber being first attacked, it proceeds progressively into the wood to the depth of about an inch and a half. The outward crust formed by these attacks then becomes macerated and rotten, and is gradually washed away by the beating of the waves. The *Limnoria* does not work by any tool or instrument, as described in the case of the teredo, and Dr. Coldstream is of opinion that the work is effected by the use of its mandibles. The *Limnoria* almost always works under neap tides; it cannot live in fresh water; and while it is destroying the surface of a pile, the teredo is attacking the interior. Examples were given to show that at Lowestoft harbour 14-in. square piles were in three years eaten down to 4 in. square; and at Greenwich a pile 12 in. square was eaten through in seven years.

The President, in speaking of methods of preserving wood, said the "Beerising" process is the invention of and is named after Mr. Sigismund Beer, a German chemist, of New York, who claims to have discovered that by boiling it in a solution of borax, wood could be speedily freed from the albuminous sap, which, from its hygroscopic properties prevents the effectual seasoning of the timber, and which, being extremely prone to ferment, by its decomposition promotes the growth of fungi and causes decay. This process differs from all other previous methods, inasmuch as, instead of seeking to impregnate the timber with preservative agents, it aims at entirely washing out and removing the cause of decay, leaving only the pure wood fibre, which itself is very durable. Wood thus treated becomes much denser, closer in grain, and harder. The pores being only filled with water, they contract as the wood dries, hence it is not so susceptible to atmospheric changes as stove-dried timber. It is not discoloured, and can be used for all kinds of cabinet-work, as well as for rough purposes. Mahogany and other wood can by this process be seasoned in the log, and cut up as required, thus doing away with the necessity of keeping a large stock. Samples were submitted of pine deck-planks, supplied to one of the Cunard Company's steamers. The planks were sawn from logs about the end of October last, and were delivered, fit for use, on December 13th, it being asserted, more thoroughly seasoned than they could have been by any other method in two years. The increased density and hardness of Beerised timber, besides improving its appearance, must materially increase its strength and resistance to wear and tear, rendering it valuable for floors of warehouses and public buildings where there is much traffic. The process is now being tested by the London and North-Western and the Birkenhead Joint Railways. Wood so prepared has also been used by the Liverpool Corporation in the erection of Steble-street Baths, and also for repairing Cornwallis-street Baths, where, owing to the heat and moisture, the timber decays in a very few years. It has for some years been used in some of the Lancashire collieries, in which wood is found to decay in a very few months, owing to the deleterious character of the water. Insects are attracted by the albuminous sap contained in the pores of ordinary timber; from this they derive nutriment, and the nourishing properties of the albumen seem to neutralise the strongest poisons, even timber impregnated with corrosive sublimate falling a prey to the ravages of vermin (*vide* "Enc. Brit.," vol. xxi., p. 279). It is claimed for the Beerising process that, by removing the albumen it removes that which attracts insects; and although no experiments have been tried to test this, the inference is that Beerised timber would not be so readily attacked by the teredo. Unlike some preserving processes, Beerising does not increase the inflammability of the wood, but rather decreases it; and after undergoing this process timber can readily be impregnated with other substances, so as to render it absolutely fireproof. The method of treating is as follows :—The wood is closely, but not tightly, packed, in a large wooden tank, along the bottom or sides of which run perforated pipes communicating with a boiler; it is kept down by strong crossbars to prevent floating; a solution of 1 lb. of borax to every thirty gallons of water is introduced, until the wood is within an inch or two of being covered, and the whole is boiled by the admission of steam, through the perforated pipes before mentioned. After boiling awhile it is allowed to partially cool, and is again boiled. This effects the more perfect impregnation, as by the first boiling the air is driven out of the pores of the wood, and on cooling, the solution is forced in by atmospheric pressure. After the second boiling the solution is run off hot, and the timber again boiled in clean water to remove all traces of the sap now in combination with the borax solution; it is then taken out of the tank as hot as possible, when it dries rapidly. It will be noted that in this process the wood is not impregnated with borax as a preservative; the borax is merely used as a solvent to remove the putrescible sap, and the

more thoroughly every trace of this is washed away, the more durable will the wood be found.

Several members present who had been in charge of marine works abroad gave the meeting much information respecting these pests; and, after an interesting discussion, the meeting was adjourned until February 1st, at seven p.m.

NEW BUILDINGS AT BALLIOL.

A new hall at Balliol College has been formed at the north end of the garden, on some land recently acquired. It is built of Tisbury and Bath stone, and is of the Geometric period of Gothic architecture. The roof is covered with green slates, and from the centre of the ridge rises a *flèche*, forming an effective ventilator. The necessity of respecting the ancient lights of Trinity College has dictated a flatter pitch to the roof than would perhaps otherwise have been adopted. Internally, the hall occupies the first floor of the building, and is approached from the garden by a flight of thirty steps 13 ft. in width, which, passing through a richly decorated open archway, brings the visitor first to the ante-hall, and then through a screen on the right into the hall. A serving-room in continuation of the ante-hall is also divided from the hall by the same screen. The internal dimensions of the hall itself are, length 90 ft., breadth 36 ft.; its roof is of open timber construction, visible to the apex. The whole of the woodwork of the hall is of oak; floor, dado, screens, and roof. Over the ante-hall and serving-room at the west end a minstrel's gallery has been formed (on the occasion of the banquet, occupied by ladies). At the east end is the high table raised two steps above the rest of the hall, with a recessed window on either side, and a panelled oak canopy at its back at the end of the hall.

The hall is divided into seven bays (including that of the high table), and is lighted by twelve three-light traceried side-windows, and a large four-light window at the east end. The hall has two fire-places, and the walls are lined with Bath stone above the panelled oak dado. The curved ribs of the roof principals are four-centred, this particular form having been adopted in consequence of the comparatively low pitch of the roof. Between the constructive lines of the principals the spaces are filled in with vertical tracery, which adds materially to the intricacy and interest of the roof. The elaborate corbels which support the roof principals bear each the arms of one of the benefactors of the college. In the east window and the two windows at the end of the high table are placed thirty-two shields blazoned with the arms of some other benefactors.

It is in contemplation to place shields in a similar way in each alternate window on either side of the hall, the whole of which are at present filled with quarry glass, relieved with designs of conventional foliage in subdued tints.

The hall is lighted at night by brass gas brackets of a somewhat unusual form, having groups of burners in a semicircle placed against the piers between the windows. The rooms beneath the hall are approached by two entrances from the garden. One of these entrances leads to the Fellows' Common Room (30 ft. by 18 ft.), communicating with the dais of the hall above by means of a circular staircase. The Common Room is made interesting by being surrounded with some fine Jacobean oak panelling taken from the old chapel. Behind the common-room is a lecture-room (28 ft. by 17 ft.), from which, by means of a private staircase, the new and spacious chemical laboratory at a lower level can be reached.

The second garden entrance gives access to the buttery and shop, communicating with the stores, wine and beer cellars, and also with a balcony on the side of the east wall of the kitchen. From this balcony the college servants obtain supplies wanted for different parts of the college without interfering with the operations of the *chef* below, the balcony and kitchen floor being united by a lift.

The kitchen itself is 36 ft. by 23 ft., and 23 ft. in height. It has been fitted up with every convenience appertaining to a first-class modern kitchen. A bakery with very large oven, a pastry-larder, coal-cellars, messroom for servants, larders for cooked and uncooked meat, stores, and scullery, are arranged contiguous to the kitchen.

Most of the new work is of fireproof construction, and has been carried out by Mr. Horsman, of Wolverhampton, under the direction of Mr. Waterhouse, architect. Messrs. Jeakes supplied the kitchen fittings, Mr. Odell the ornamental glazing, and Mr. Capel the furniture of the hall, from the designs of the architect.

ROYAL ARCHITECTURAL MUSEUM.

The museum is now open free daily from ten till four, Saturday till six, and every evening except Saturday from six till nine. There are art-workmen's evening drawing and modelling classes, at 6d. per week. The treasurer, Sir Gilbert Scott, is making a personal appeal for the support of this Institution to all those who value the progress of architectural art. The treasurer says:—"Though we, as architects, have it fully in our power to define all the more mechanical portions of our designs, such as mouldings and other definite architectural features, and that with such precision as to leave no room for error or misunderstanding on the part of the workman, such is by no means the case with those artistic touches, such as carved foliage, decorative painting, or ornamentation in metal, which add so much life and zest to architecture when well carried out, and do so much to lower it when inartistically executed. To enable the humble artists who carry out these important parts of architectural design either fully to appreciate the drawings laid before them, or to share, as in all healthy periods of art has been the case, this work with the architect,—to act, as has been aptly said, as his hand in this part of his work,—carrying out to the life his thoughts and intentions,—it is necessary that our carvers, &c., should be thoroughly acquainted with the works of their predecessors of the best periods in their several arts. They have not funds nor time to search out and visit these works *in situ* excepting on comparatively rare occasions; and the best means of meeting this difficulty is, clearly, to bring specimens of such works together for their easy reference."

The narrow views (as we are forced to call them) which have made this institution, not the Architectural Museum desired, but a collection of specimens illustrating with trifling exception only one phase of architectural art, have greatly limited its usefulness and popularity, and these limits have been drawn tighter and tighter since its removal to the wretchedly uncomfortable and ill-contrived warehouse in the undiscoverable place in Westminster called Tufton-street. We claim to be of those who originated the idea, and have long given the institution our best support. We grieve, therefore, the more at its want of success, and the constant passage of the begging-box. If some enterprising railway company, or the action of the Artisans' Dwellings Act, would enable the committee to remove to more comfortable premises in a convenient and easily-reached locality, better days might be hoped for.

THE NEW PARISH CHURCH OF ST. MARY, WHITECHAPEL.

VISIT OF THE ARCHITECTURAL ASSOCIATION.

The Architectural Association on Saturday last, the 20th inst., visited the new parish church of St. Mary, Whitechapel, this being the Association's first "visit to works in progress" for the present session. The church (which is to be consecrated on the 2nd prox.), has been erected almost entirely at the cost of Mr. O. E. Coope, M.P., from plans by Mr. Ernest C. Lee, architect, the builder being Mr. John T. Chappell, of Westminster and Brighton, Mr. Ansell acting as clerk of the works. In the unavoidable absence of both architect and clerk of works, Mr. Groves, the contractor's foreman, accompanied the visitors over the building, explaining the details of construction. The church partially occupies the site of its predecessor, an unsightly structure coated externally with painted compo, and dating from 1673. Mr. Groves stated that in the course of the demolition of the old church the floor of a still earlier church was discovered, 8 ft. below the level of the floor of the late church. The new church extends about one-third further eastward than its immediate predecessor, and its orientation has been inclined rather more towards the north, in order to get the whole of the building upon freehold ground, part of the churchyard being leasehold. In the course of removing the old building and digging the foundations for the new one, a large number of coffins (upwards of 300) containing human remains had to be removed; they have since been deposited partially in the base of the tower, and partially in a large brick chamber constructed for their reception beneath the gallery at the west end of the church, the remains in each case being deposited a considerable distance below the floor-line, and covered in firstly with a layer of lime, secondly, with a layer of concrete, and finally sealed up by brick arches. The foundations of walls and piers go down to a depth of 20 ft., the first 6 ft. consisting of concrete. The bed of concrete supporting the piers is continuous. The church consists on plan of nave, aisles, chancel with semi-circular end, clergymen's vestry, on the north-east; what is called the "Church-room" (intended to be used for Bible classes, "mothers' meetings," &c.), on the south-east; and tower and porch at the north-west corner. The nave is 109 ft. long from the west door to the chancel arch, and 38 ft. wide, the height being 51 ft. from the floor to the wall-plate, about 65 ft. to the apex of the wagon-vault, and about 85 ft. to the external ridge. The chancel is 37 ft. 6 in. long by about 27 ft. wide, the height to wall-plate being 40 ft. The aisles are about 14 ft. wide, and the height of the tower and spire when complete will be about 200 ft. Seats will be provided for about 1,250 persons, distributed somewhat as follows:—Nave, 582; aisles, 390; choir, 52; west gallery, 156 (children); and space under the gallery, 68. The main walls are about 2 ft. 7 in. thick, faced externally and internally with Allen's Suffolk red bricks, four courses to the foot (the filling-in consisting of stocks), with external dressings of Doulting stone, Bath (Corsham) stone being used internally except for the piers and springers. The nave consists of five bays, the piers being of Portland stone bedded with 4-lb. sheet-lead, and 16 ft. 9 in. from centre to centre. The capitals of the piers have been carved by Mr. Earp, of Lambeth, to represent the heads of the Apostles, and the pulpit (which was not *in situ* on Saturday last) is of stone, and also carved by Mr. Earp. The nave roof is carried by king-post principals, with the tie-beams cambered to the extent of 4 in., the bottom of the king-post being about 10 ft. 6 in. below the level of the top of the arched transverse member. The principals are of deal, unstained, and the roof is boarded internally with ¾ in. grooved-and-tongued deal match-boarding (also left unstained) in the form of a continuous barrel-vault, divided into bays alternately by the arched member of the roof-truss before referred to and by a projecting rib of the same size as the arched member carried up from the shaft which runs up from above the capital of each pier of the nave, the roof principals coming midway between the piers and resting on the wall-plate immediately over the centre of the comprising-arch of the clearstory windows. Externally the roofs are all boarded and covered with Whitland Abbey green slates, capped with red ridge-tiles specially designed by the architect, and supplied by Cooper, of Maidenhead. The church was originally planned with transepts where the easternmost bays of the nave now come, but, for some reason not explained, these have been omitted. The easternmost bay of the nave on the north side has its arch much loftier than those of the remaining bays, and this necessarily entails the dwarfing of the clearstory windows above, which are only one half as high as those in the other bays. This irregularity or quaintness of effect has been necessitated by devoting this bay of the nave to the organ. The organist will sit in the choir, the keyboard projecting through a sort of doorway made for the purpose, and communicating with the organ by means of trackers. The organ is being built by Messrs. Hill & Son. The clearstory windows consist, in each bay, of two double-lancets with cinquefoil heads. The large windows at the west end comprise two large double-lancet windows, each light being trefoil-headed, and each pair of lights being surmounted by two quatrefoils and a cinquefoil. In the gable above these two double lights is a rose-window, about 14 ft. in diameter, and consisting of seven cinquefoils surrounding a sept-foil. The tympanum of the west door is pierced with a cinquefoil light intended to be filled with stained glass. On either side the west door is a double-lancet light surmounted by a quatrefoil. At the west end of the church is a cross gallery with a brick front supported by an arcade of three bays ranging with the west door and the windows which flank it. The centre bay or compartment (ranging with the door) is divided longitudinally from the side bays by smaller arcades of three arches, and will contain

the font. The aisle windows face the centre of each bay of the nave arcade, and consist, in the external half of the wall, of three dwarf lancet-lights embraced within one relieving arch, the window-space being divided internally by two pointed arches, meeting over the centre of the head of the central lancet, and supported on a stone shaft or column, which obscures the greater portion of the said central light. The chancel or apse is lighted by thirteen lancet lights. The glazing throughout is in tinted glass, and has been done by Mr. Odell, of the City-road. The flooring in the nave consists of wood blocks about 2 in. thick, laid flat, herring-bone fashion, in cement on a bed of concrete, 6 in. thick. The floor of the apse is of mosaic, and is being executed by Messrs. Burke, of Regent-street, from a design by the architect. The wall space of the chancel or apse is plastered all round to a height of about 30 ft. (*i.e.* to the cills of the lancet windows), with the view of being ultimately covered with paintings either in fresco or otherwise. It was stated by Mr. Groves that no special means had been taken to keep this wall free from damp, except that it is well and solidly built, and, like all the main walls of the church, has a thickness of about 2 ft. 7 in., none of the walls being hollow. The warming apparatus is the gift of Mr. Jennings, of Stangate. The sittings will be plain open benches, of deal, varnished, but not stained. The tower, as before stated, is to be surmounted by a spire, the total height to be ultimately attained being 200 ft. At present, the tower is only completed to about the height of the wall-plate of the nave; the necessary funds for its completion are in hand, but it is thought desirable to allow the lower portion to consolidate before adding the superstructure. The lower part of the tower serves as a porch, the north door of which will have an elaborately-sculptured tympanum. The moulded bricks, used both externally and internally, came from Richmond, and the mortar used throughout was made of Dorking lime, ground. One or two relics of the old church have been preserved in the new building, notably a carved oak panel representing "David, the sweet singer of Israel," and said to be by Grinling Gibbons. This, together with the oaken pediments of two old doors, have been fitted up in the "Church Room," already mentioned. The contract for the foundations was taken at 4,500*l.*, and the contract for the works now drawing to a completion amounted to 15,500*l.* The completion of the tower and spire, the decoration of the chancel, and various "extras," will bring the total cost up to about 30,000*l.* The general opinion of the visitors seemed to be that the building reflected credit on architect, builder, foreman, and all concerned in its erection.

THE NEW CLOCK TOWER ON THE SITE OF OLD NEWINGTON CHURCH.

WITHIN the last few days practical steps have been taken to carry out the new clock tower, on the site of the old parish church at Newington, which Mr. R. S. Faulconer has offered to erect at his own expense. Messrs. Jarvis & Son, architects, of Trinity-square, Southwark, have been selected by Mr. Faulconer to furnish the design for the tower, and to superintend its erection, and, as a preliminary step, they have been in communication with the Newington Vestry as to the lighting of the clock. At the meeting of the vestry last week, a letter was read from Messrs. Jarvis, asking, on behalf of Mr. Faulconer, whether the vestry would be willing to bear the annual expense of supplying the gas necessary to illuminate the dials of the clock, of which we understand there are to be three. Messrs. Jarvis stated that they made the application thus early, on the ground that it was necessary for them to obtain the information asked for preparatory to arranging the plan of the interior of the tower. Several members of the vestry, in speaking upon the subject, said they were all deeply indebted to Mr. Faulconer for the generous offer which he had made, inasmuch as the proposed clock tower would not only be a great public convenience, but an ornamental architectural structure on the site of the old church, which was about to be artistically laid out. The vestry unanimously decided to bear the expense of illuminating the clock. The project has the approval of the rector of the parish, and the work will now be at once proceeded with. We understand that the idea is to erect the tower as nearly as possible on the exact portion of the site of the church above which the old belfry until recently stood. We may add that the new carriage-way in front of the churchyard was thrown open for traffic on Monday week, and that the churchyard will be enclosed by a wall and iron palisading, now in course of erection. The wall, which is faced with blue Staffordshire brick, with stone coping, will be 3 ft. in height, surmounted by palisading about 4 ft. high.

RAILWAYS AND THE INCREASED PRICE OF BUILDING LAND.

AT the meeting of the South-Eastern Railway Company held last week, Sir Edward Watkin, the chairman, gave an illustration of the enormously-increased value given to land for building purposes by the introduction of railways. Speaking of the threatened opposition of Lord Sidney, the Lord Lieutenant of Kent, and the magistrates of that county, to the proposed amalgamation of the South-Eastern with the London, Chatham, and Dover Company, he said:—"I think it is a little ungrateful on the part of the respected Lord Lieutenant, because it is within my personal knowledge that before the short railway near Tunbridge was opened, passing near his lordship's estate at Chislehurst, land was not worth much more than 100*l.* per acre, and a relative of mine has just been buying from his lordship two acres and a half to build a modest house upon, and has paid 800*l.* an acre for it, and it is two miles from the station. Now I contend that Lord Sidney's estate in the neighbourhood of Chislehurst has been increased from 800 to 1,000 per cent., and it is rather hard that he should be appointing a committee to resist and oppose our amalgamation without giving us an opportunity of proving to him, as I will undertake to prove to any committee of sensible men that Parliament may appoint, that whatever it may do for you (the shareholders), and whatever it may do for the Chatham Company, as regards the public there never was a greater benefit conferred upon the county of Kent, and all the other counties intersected, than by working these two companies in co-operation."

OLDHAM SCHOOL OF SCIENCE AND ART.

LAST week Mr. Joshua W. Radcliffe distributed the prizes to the successful students attending the Oldham Science and Art School. Mr. W. Richardson occupied the chair. A good report was presented.

Mr. Radcliffe, in the course of his address, said:—The present accommodation was very inadequate. Accommodation could only be found for 160 students, leaving a deficiency of 170 or 180. It was, therefore, obvious that it had become the duty of the public to provide this extra accommodation which was so desirable and so necessary. At the same time the increase that was asked for was very large, and they could not do it all at once. However, it was his pleasing duty to tell them that the sons of the late Mr. Platt had determined to give the town the increased accommodation which was so much desired. They had concluded to personally defray the cost of raising the present building two stories, thereby giving more than double the accommodation which at present existed. This work would be completed without delay. It was not for him to dilate upon this act of generosity, but he was quite sure the people of Oldham would rejoice that the work which had been begun and continued by the late Mr. Platt would be so excellently ended, if he might use the expression, by Mr. Platt's sons.

A FRENCH MODEL.

IT is not uncommon, and we know at least of one instance, for English artists to remit to Rome small sums of money to be distributed among necessitous models, or as presents to old favourites who in former years had sat their patient days to create the golden hours of the embryo academician.

In Paris, where so many artists look back to Rome, and the happy dreamy days at the Villa dei' Medici, tales of empty *scaldini* and limited *polenta*, from the neighbourhood of the Via Porta Pinciana reaching the well-to-do painters, readily meet with a charitable response.

Dubosc, a famous French model, died on January 15th, at the age of eighty, bequeathing his boarded gains to the young artists striving for the "Grand Prix de Rome," at the Beaux Arts. Dubosc, who commenced to sit at seven years of age, in 1804, had successively posed for Louis David, Gros, Abel de Pujol, Baron Gerard, David d'Angers, Ingres, Rude, Delacroix, and so on down to Flandrin, Guillaume, Crank, Gerôme, and Baudry.

Throughout that interesting period of the first quarter of this century, when the Classicists and the Romancists, the colourists and the purists, were thinking and working out their great aims, Dubosc was rarely absent from one or another of their studios, and in those pictures for which he sat he took especial interest when they received the recompenses of the *salon*; and, doubtless, in investing his savings connected with the picture, he named them by the title of the subject.

During his life he had frequent opportunities of knowing the difficulties that the artists of those days, if not of the present, had to contend against, in meeting the demands on their pocket, and he has been well remembered as having occasionally supplied the young artists with the necessary funds to help them through with their work, and he must have early determined that if ever he should have the means he would do his best to make their lives more easy.

At his death it was found that he had left a will to the following effect:—

"This is my testament.

I, undersigned, Charles Alis Dubosc, declare the following testamentary dispositions:—Having commenced to sit in eighteen hundred and four, at the age of seven, and having continued to serve as a model till seventy-two, I have thus passed my life with the most distinguished artists. I wish that after my death the little fortune that I have gained with them should be consecrated to a foundation useful to artists.

Consequently, I name as universal legatee the Institute of France, Académie des Beaux Arts, to dispose of my succession in the following manner: after the payment of all the expenses, what composes my succession, in the Three per Cents., shall be distributed each year in equal portions among the young painters and young sculptors received '*en loges*' * for the 'Grand Prix de Rome'; this sum to be remitted to them at the moment of their admission.

Done and written entirely by my hand, at Paris, the 22nd of July, 1859.

(Signed) DUBOSC."

GRANITE BUILDING.

THE destructive and disagreeable effects of the London atmosphere—charged as it is with acids and soot—upon stonework, have long been known and regretted. It would, therefore, be a great advantage if a more permanent method of external construction could be introduced; and charming indeed, if, instead of our miles of streets of lugubrious smoke-defiled façades, we could substitute some method of building that would give us freedom from decay, and permanent beauty and cleanliness.

We recently† directed the attention of our readers to a few ancient and modern granite buildings, and a careful consideration of the favourable circumstances of the present day induces us to come to the conclusion that the use of granite is not only possible, but that it may help us out of a very unsatisfactory state of things. Notwithstanding our boasted science, we build to-day just as Sir Christopher Wren did, and though we see our buildings perish before our eyes, we introduce no improvement in their construction.

Not many years ago—before steam and machinery had been applied to building operations—it would have been a waste of time to suggest the propriety of facing our buildings with this hard, intractable, and durable material instead of soft stone. But what a change has taken place during the last forty years in economising labour by the aid of mechanical appliances which convert with wonderful facility the hardest or the softest materials to any form we desire, and bring them to our hands from distant parts at prices that would once have been thought inconceivably low!

We think, then, that the circumstances of the

* The competitors for the "Grand Prix de Rome" enter "*en loges*" for six weeks; they are absolutely sequestrated, and the subsidy of three hundred francs allotted them by the Administration of the Beaux Arts is paid in two terms, at the middle and the end of the competition.

† See p. 1221, vol. xxxiv.

day are altogether in favour of the suggestion we make. The attempt is worth making—nay, considering the scientific character of the age, and that, looking at the perishing state of our public buildings, somewhat of a stigma rests upon us, it is, we venture to think, absolutely incumbent, at least, upon the leaders of the profession to make it. They would then, perhaps, be able to show that the dreary hope of the second Royal Commission, after taking evidence on the decay of stone, recommended by the first Commission, "that some remedy would be found," had been realised. Of course it is only by the aid of machinery that it will be possible. As artists we may have a natural dislike of the use of mechanical power in art-work; yet, as practical men, we know that a rich architectural façade is full of detail that can, by its means, be done perfectly.

Let us then endeavour to realise the character and details of a granite structure of the nineteenth century.

As with the most costly marbles, the beauty of granite is not perceptible till it is polished. This is so far fortunate, for it is only a polished unabsorbent surface that will give permanent purity and cleanliness to any building in our smoky atmosphere, or that will secure it from the destructive acids discharged from certain manufactories. Experience shows that there is nothing disagreeable, as might be supposed, in the effect of large polished surfaces. The glare caused by refraction is only observable when the sun's ray is at a certain angle, and this effect is so limited, both in area and time, as to render it a matter of no importance. On the other hand, in every other part of the façade we should have what artists term "depth of tone," an effect altogether pleasing.

Now, as the most polychromatic building ever erected in artificial materials can be rivalled in the various colours of granites,—black, from Castle Wellan in Ireland, and from Clee Hill dhu in Shropshire; white, from Kemnay in Scotland, and, though not so pure, from Cheesewring in Wales; red, from Peterhead, the Isle of Mull, and elsewhere; grey and blue, from several localities; and yellow, according to Dr. Borlase, from Cornwall,—general treatment is a mere question of architectural design which every artistic architect will be able to determine without a word from us. With one or other of these colours for the general surface, and two or more of the others used for the different orders of the jambs and arches, and for the several members of base-mouldings, strings, and cornices, but little moulded work and ornament slightly sunk below the general surface would be required to give perfect finish of detail to a building of the highest class. The ornament might be Arabic in principle, so that the limited proportion of ground left might, if particular richness were desired, be gilt. Properly done, we apprehend there would be no gaudiness of effect in this, but only a rich lustre in harmony with the general polished surface.

In important edifices, figures in friezes, panels, and spandrels of permanent mosaic would take the place of the sooty statuary and bas-reliefs of stone buildings.

With these elements at command we cannot doubt that the application of this method of construction to our public buildings is well worthy of the serious consideration of architects. Indeed, after much consideration, it appears to us the only means of getting rid of what,—in this scientific age,—is almost a national disgrace, viz., the rapid decay of the external stonework of the public buildings of our cities.

It was but lately that we saw a forest of scaffolding about the Houses of Parliament, which may be said to have been only recently completed. Constant repairs are going on at the Abbey. Not an ancient stone exists of the Temple Church or Henry VII.'s Chapel. At the new front of Buckingham Palace the sentries were in danger from falling stones a year or two after it was built. And recently considerable repairs have been made.

As to the question of relative cost, railways and machinery have, during recent years, been gradually reducing both the prime cost of granite and the expense of working it. The steam sand-blast, for example,—recently explained in our pages,—would execute the kind of ornamentation spoken of above with extraordinary rapidity and precision; and, as is well known, polishing machinery is now in daily use.

A rough estimate of the cost per square foot of the two fronts of the New Post-office,—rough that is as showing *minimum* cost,—gives 20*s.*

Polished Aberdeen granite for ashlar, 6 in. thick, and with sufficient bond stones, can be delivered at London railway stations at 4*s.* 4*d.* per square foot, thus leaving the ample margin of 15*s.* 8*d.* for the other items of a granite façade, viz., cartage in London, scaffolding, ornamentation as above described, setting, and profit.

COMMISSIONS.

SIR,—Are not both Mr. C. Barry and yourself a little hard on those who hold that the majority of architects, &c., do accept commissions from tradesmen, manufacturers, and others? You are requiring that name and address should be given. Will you kindly turn over in your mind what this involves,—viz., that one of the two parties should "split"? The professional gentleman is not likely to do this; neither is the manufacturer nor tradesman one whit the more likely to do so, seeing that he would ever after be a marked man, and there would be raised a very practical, if not an out-spoken cry,—"'Ware Smith," "Jones," or whatever other patronymic might distinguish the rash and adventurous man.

When Mr. C. Barry claims the right to be furnished with name and address, he must as a business man know that he will never get it, and that it is absurd publicly to set up such a claim, which sounds plausible enough to the outside public. Only a man who has retired from business would venture to give the information sought; and such persons would not generally care to incur the worry of bringing the odium upon himself that such disclosures would involve.

Kindly submit this view of the matter to the consideration of your readers and correspondents, which, I think, will be only justice to numerous old subscribers who are manufacturers.

FAIR PLAY.

"BYE-COMMISSIONS."

IN reference to this question, and more particularly in reference to Mr. Barry's letter, I send you copy of a local paper, in which you will see a case in point, where an architect in a public court of justice lays claim to commission from a contractor without the consent of his client. "One illustration is worth a thousand arguments." About a year ago the Local Board of Horbury discovered that their engineer, Mr. Lumley, of Bradford, was receiving commissions varying from 3 to 4 per cent. from several contractors, in addition to 3 per cent. from themselves. The whole of their discussion upon this was reported at length in the Ossett papers. Mr. Lumley acknowledged receiving 3 per cent., and justified himself in carrying out the custom. This "custom" of certain professional men is well known, and the apparent ignorance of men in high positions will not in any way tend to alter facts which cannot be gainsaid.

If ignored for the "credit of the profession," that credit will never become as it should be, without fear or reproach.

I shall be glad if you will publish this letter, also the first case *in extenso*, as this question is exciting very great interest. A. B.

Wakefield County Court, Tuesday, January 9th.
(Before Mr. Serjeant Tindal Atkinson.)

SYKES *v.* SHAW.—The plaintiff in the case, Mr. William Sykes, joiner and contractor, of Rothwell, sought to recover the sum of 33*l.* 15*s.* from Mr. John Shaw, architect, of Leeds and Ilkley. The case excited much interest in the building trade, many connected with the various branches being present; it also possessed features of public interest, from the attention which the subject of the relations subsisting between architects and solicitors on the one hand, and contractors and traders on the other, has received from the London and provincial press. The amount claimed was for money advanced as loans. Mr. E. Tindal Atkinson was for the plaintiff, and Mr. Hall, of the firm of Gill & Hall, for the defendant. The plaint had been heard previously, and a verdict taken for the amount; but a new trial was applied for on the ground of the trial having taken place somewhat unawares to the defendant. By this, it was alleged, he was prevented from pleading a set-off of 59*l.*, which, if allowed, would have made him a creditor for 26*l.* 5*s.*: Mr. Shaw not disputing the correctness of the amount for which he was sued, but contending it had been paid him on account of professional charges, of which the sum named above was still due. The plaintiff had had three contracts, namely, for a school and eleven cottages at Crigglestone, and for a chapel at Stanley. In each case Mr. Shaw had been the architect. Amongst the sums forming the amount claimed as a set-off were included 2½ per cent. for quantities on a contract amounting to 1,175*l.*, three guineas for three sets of plans and specifications, the costs of three journeys to Wakefield to guarantee the plaintiff's timber merchant, the measurement of extra work, half the costs of an arbitration in connexion with the new chapel at Stanley, &c. There was a good deal of conflicting evidence as to the customs of the trade, as to the payment for specifications and other matters, and the case lasted a long time. The judge, in summing up, commented on the relations which appeared from the evidence to have subsisted between the plaintiff and defendant, considering that architects should stand in a position of independence towards contractors in order to justify the confidence which ought to be placed in them by those from whom they accepted commissions; it being evident that when a person had received a loan, and, as it would perhaps sometimes happen, was not in a position to repay, the sense of independence could not exist. The jury found a verdict for the plaintiff for the full amount claimed.

CLAIMS BY SUB-CONTRACTORS.

CULLEN *v.* AITCHISON AND WALKER.

THIS was a claim (heard in the Bloomsbury County Court on the 11th inst., before Mr. G. Lake Russell, judge) brought by a stone mason, to recover from Messrs. Atchison & Walker, builders, the sum of 5*l.* 3*s.* for work done and materials supplied, in the building of the schools for the London School Board in Aldenham-street, Somers Town, for which the defendants were the contractors:—

Plaintiff said he first saw the foreman to the defendants, who told him what stonework was required to be done and then introduced him to Mr. Walker, one of the defendants. He told Mr. Walker he would do the work for 21*l.* 12*s.* The work was done to the satisfaction of the architect, and defendants paid him 16*l.* 10*s.* 6*d.*

In cross-examination plaintiff said he provided the stone and work according to the plan and quantities. On his receipts being handed to him he admitted that he had no doubt received 17*l.* 12*s.* 6*d.*

On the part of the defendants, it was submitted that the plaintiff had been overpaid 4*s.*, as the work was to be paid according to the quantity.

Thomas Heatley, foreman to the defendants, said that the contract price was to be 21*l.* 12*s.*, according to the bill of quantities, which he gave plaintiff, and the plan, of which he gave him the tracing.

Mr. Walker, one of the defendants, said the plaintiff was to do the work according to the bill of quantities, and for which he had been paid; no objection was made to the work. Not half the quantities were supplied; the plan supplied to plaintiff was for the working details."

The Judge: The quantities were part of the plan, but there was not room for them.

Mr. Brunsden, surveyor, said the quantities included window-sills, but as the windows were omitted the sills were not required, and the doorways were not made so thick as in the plan, for want of room; the price for these, for materials only—not work—was 4*l.* 17*s.* each, which would require to be deducted.

Plaintiff, recalled, said he made the reduction in the price in consequence of being told of work which would not be required.

Judgment for the plaintiff for the amount claimed, less 9*s.* 6*d.*

ROGERS *v.* MOORE.

THIS was an action tried in the Brompton County Court on the 16th inst. (before Mr. Serjeant Wheeler, judge) to recover the sum of 6*l.* 18*s.* for work done by the plaintiff, a plumber, of Shepherd's Bush, for a builder of Notting-hill.

Mr. Thomas, who appeared for the plaintiff, said the claim was for balance due for work done on three houses belonging to defendant. His client was a man who hardly knew how to read or write, and unfair advantage was taken of this in connexion with their business transactions.

Plaintiff stated that he did the work in question.

Mr. Newman, for the defendant, said he did not dispute that the work had been done.

Plaintiff, in continuation, said he made a contract with Mr. Emmerson, but had nothing to do with Mr. Moore until after the contract had been made. Mr. Emmerson paid him 3*l.* on account, and told him that defendant had taken entire charge of the work, and was responsible for all payments. Mr. Moore had made payments on account of the work done, and plaintiff would not have gone on with the work had he not thought that he would have been paid by the defendant.

Mr. Emmerson was called, and said he gave plaintiff the work to do, but he never told him that Mr. Moore was responsible for payment. Witness paid plaintiff 3*l.* out of his own pocket, and the rest of the money was borrowed from Mr. Moore. The houses were built, and afterwards mortgaged to a building society at Woolwich.

Defendant said that plaintiff came to him one evening and said that he could not get any money from Mr. Emmerson, and defendant said if he would finish the work on the third house he would pay him for it.

The judge said it was quite clear that a contract had been made between Mr. Rogers and Mr. Emmerson, and the present defendant was not liable.

Verdict for defendant.

THE SGRAFFITO WORK AT SOUTH KENSINGTON.

SIR,—The following paragraph has appeared for some weeks in an advertisement on the front page of the *Builder*:—

"Messrs. Trollope & Sons have engaged the exclusive services of *the* artist who executed the sgraffiti to at South Kensington and elsewhere," &c.

As the whole of the sgraffito at South Kensington was designed by me, and executed by my pupils under my superintendence, I venture to beg a space to state that the above paragraph does not refer to myself nor to the two leading artists engaged on its actual execution, and that it continues to be inserted in your paper in spite of my repeated objection.

F. W. MOODY,
Instructor in Decorative Art,
South Kensington Museum.

ST. AGNES'S NEW CHURCH, SCHOOLS AND VICARAGE, KENNINGTON PARK.

THE new church of St. Agnes, Kennington Park, which has been in course of erection between two and three years, and which has already been noticed in our columns, has been consecrated. The architect of the church, as well as of the schools and vicarage immediately adjoining, is Mr. George Gilbert Scott, jun., the style of architecture of the three structures being Early English. Exactly twelve months elapsed between laying the foundation-stone of the church and that of the schools, and a similar period intervened between the commencement of the schools and the vicarage, the foundation of the schools having been laid in July, 1875, and the vicarage in July of the past year. The schools were recently completed, and have been open during the past few months, and the vicarage has just been covered in. The three structures, which form a prominent feature immediately on the east side of Kennington Park, cover an area of about 24,000 superficial feet, or upwards of half an acre in extent. There are several specialities about the church, one of which is that by a gradual spreading of the walls from east to west, the interior dimensions of the church are broader at one end than at the other. Another distinctive feature in the edifice consists in its unusually lofty nave, nearly 60 ft. in height within. The nave ceiling is continued at the same elevation over the chancel, admitting of an unusually lofty chancel window, 40 ft. in height, and 15 ft. 6 in. in width. This window has been filled in with richly-stained glass of elaborate design and execution, the design as well as the workmanship being both by Mr. Kemp, of Beaufort-street, Cavendish-square. The prominent subjects in the window consist of scenes in the life of Our Saviour, from his birth to his death. A central mullion divides the several groups and figures represented on the right and left hand sides respectively. The various groups are about forty in number; those on the left-hand side containing scenes emblematic of the Incarnation, and those on the left scenes from the Passion. The upper portion of the window contains grouping and figures of the prophets illustrative of the genealogy of our Lord, with the tree of Jesse. With one or two exceptions, this window is said to be the loftiest of any church window in the metropolis.

The half-barrel nave and chancel ceilings are in panels, and at present painted white, but are ultimately intended to be richly gilt and decorated, whilst the ceilings of the aisles will be groined and vaulted in oak; but this portion of the work is likewise deferred for the present, as well as other intended decorations. A dado, upwards of 6 ft. in height, is carried round the interior walls, and the piers of the nave arcades are also covered with boarding to a similar height. Both the dado and the boarding round the piers are painted chocolate colour. The chancel is divided from the nave by a lofty Gothic screen, 18 ft. in height from the nave floor. Over it is a loft carried across the nave, and surmounted by an arched beam supporting above a massive cross upwards of 4 ft. in height. The loft is intended to be utilised for an orchestral band on the occasion of high festivals. The organ is placed on a level with this loft, and when finished will be in two divisions, in chambers on each side of the chancel, similar to that in St. Paul's Cathedral, the loft serving to connect the action. The loft and organ are reached by a circular iron staircase, carried up alongside the pier of the south chancel arcade. The chancel and altar-floor level is about 5 ft. above that of the nave, and is approached by flights of ten steps. There are spacious chapels on each side of the chancel, which is very spacious, with clergy and choir stalls. The cost of the edifice up to the present time has been about 12,000*l.*, this being exclusive of the tower and other works and decorations still required before the church is entirely completed.

Messrs. Niblett & Co. were the original contractors, but Messrs. Hill & Higgs, to whom the contract has been transferred, are finishing both the church and the vicarage.

New Palace and Winter Garden at Manly Park, Manchester.—This competition was decided at the last meeting of directors, and the first premium was awarded to Mr. J. T. Robinson, Bloomsbury-square, who adopted the motto "Solo Deo Salus."

BUILDING BYE-LAWS.

DEPOSIT OF NOTICE AND PLANS,—PENALTY FOR BREACH.

AT a Petty Sessions held at Bromley, Kent, on the 1st instant, Mr. Frederick Padney, a builder, of Lower Norwood, was summoned at the instance of the Bromley Local Board for having commenced to build a certain house within the Board's district without giving the notice, or depositing with the surveyor of the said Board the plans and sections required by their bye-laws.

The defendant pleaded guilty. Mr. Joshua Bailey, the clerk to the Local Board, prosecuted, and stated that the information had been laid to recover a pecuniary penalty for an infringement of the 29th and 33rd bye-laws; but, inasmuch as the defendant had immediately upon the receipt of the surveyor's notice discontinued the work, and furnished the requisite plans, and had, moreover, addressed a letter to the chairman of the Board expressing his regret for the omission to furnish such plans in the first instance, he (Mr. Bailey) was instructed to ask that a nominal penalty only should be inflicted.

The justices thereupon informed the defendant that as the Board were disposed to deal leniently with him, they would make an order for payment of the mitigated penalty of 5*s.* and 8*s.* costs.

WANTED, A STATUE FOR THE THAMES EMBANKMENT.

SIR,—I never saunter along the Thames Embankment without thinking of it as, in Lord Harrowby's words, the noblest boulevard in the world, carrying health, freshness, and beauty through our crowded city from end to end, and without feeling how discreditable it is to all of us that no "counterfeit presentment" of its author has as yet been set up within its range. Every year the advance of science more and more assures us of the inestimable value to people of all classes, and especially to people of the working class, of large open spaces, either within towns or in their vicinity. With this knowledge comes to all who have taken an interest in the history of this question, the remembrance of Mr. Cowper-Temple, the introducer and carrier of the Thames Embankment Bill, and the valorous champion, for more than a generation, of commons rights, of parks and village greens, and other open spaces, which, as he truly contended, have done more to promote the happiness of the English people than any other institution handed down by their Saxon forefathers. When Epping Forest was in danger from attempted inclosure, this real statesman persistently and eloquently defended, year after year, the rights of the people against the encroachments of the lords of the manor. Again and again did he generously remind the House of the rare value of the forest to the teeming population of the East-end of London; and on one memorable occasion he saved this magnificent piece of public property in spite of the opposition of the Liberal Government, actually defeating them by a majority of 100. In the General Inclosures Act, he succeeded in getting incorporated a clause that in all future inclosures of waste land certain portions should be set apart for labourers,—an idea first broached by him in the year 1843. Last year he gallantly struggled, but in vain, to get introduced into Mr. Cross's Commons Bill a clause which would prevent inclosures within six miles of London, and within certain fixed distances of other towns according to their population. For all his fidelity to the cause of health, recreation, and happiness all over the country, surely the people benefited should insist on a public recognition of the services of this gentleman on the scene of his most memorable victory in the interest of that great and glorious goddess Hygeia, whose shrines are, alas! so generally neglected, but whose supremacy will yet regenerate the world. I am confident, sir, if you were to moot the matter in your journal, a sum sufficient to raise a handsome statue to the right hon. gentleman on the Embankment would speedily be contributed. I should myself have great pride and pleasure in initiating a subscription for this purpose by putting down a guinea. Be it remembered that the vast London public are not only indebted to Mr. Cowper-Temple for their splendid boulevard, but also for the present state of the parks in summer-time. At his magic bidding, when Commissioner of Public Works, beautiful shrubs of every shade of green sprouted out all over these metropolitan reservoirs of health, and sweet flowers, judiciously selected for their charmingly harmonising colours, budded and blossomed forth in bewitching purple and gold, in crimson and buff, in blue and pink, and lilac, where before all was sombre and tintless. In the midst of the furious debates in Parliament, in July, 1866, concerning the then recent Hyde Park Riots, it was very amusing to note how eagerly and triumphantly Mr. Cowper-Temple called attention to the fact that the improvements in his department were thoroughly appreciated by the "roughs" in the crowd who had torn down the park railings in their excitement in order to baffle the police, but did not forget the flowers whose beauty had afforded them so much pleasure, and carefully avoided interfering with the beds. No one could deny this; and assuredly the man who thus succeeded in humanising to such an extent that apparently most unpromising class of bipeds—the London "roughs,"—deserves, even for this service alone, to have his face and figure copied in marble or bronze, and set up on high amongst us.

Hoping you will act instantly on my suggestion, and that some famous sculptor may very speedily be set to work on the statue proposed, I remain, a worshipper of trees, shrubs, flowers, and pure air. S. L.

PLAN OF DRAINS.

SIR,—Under the above heading your correspondent "M. G." suggests that it should be compulsory on the part of the landlord to show the nature and direction of the drainage of his letting. I quite agree with him; but I also maintain that every one should be able to find the same out for himself at the offices of the surveyor to the vestry of the district.

Such, however, is not the case; and I believe a large amount of old house property, especially of the poorer description, is still drained into cesspools, and has no connexion with the main sewer, even though the latter is at the front door.

I some time since had occasion to make inquiries as to the drainage of a property in the S.E. district. The surveyor was unable to produce any plans showing the connexion of the properties with the main drainage, or tell me how it was drained; and from a deed which came into my hands in course of business I found that the property in question,—and I have little doubt a quantity more of the same kind,—was drained into a huge common cesspool, in a neighbourhood where (and no wonder) there is always more or less disease epidemic. I also found that the pipes used were the ordinary old porous pipes, and, in fact, the whole ground appeared to me to be permeated with the odour of drains.

Surely such things ought not to be under such a body as the Metropolitan Board of Works. They should not, and the public should require of them not to be satisfied until it can be shown beyond a doubt on paper and by actual inspection that every closet and drain within the district is properly connected (and with proper materials) with the main drainage. I found not long ago that a street in the N. district was drained with 9-in. pipes instead of 12-in.!

J. H. C., Surveyor.

SIR,—Years ago I wrote you, in a letter you kindly published, a plan which, I would submit, is likely to be more effectual than that of "M. G."

I recommended that a plan of the drains of every house, warehouse, or building, should by Act of Parliament be made compulsory to be affixed to the inside of the front door, or some other eligible place, so as to be always at hand for immediate reference. It is all right that the same plan should also be on every lease, but the lease is not always forthcoming for inspection when required.

R. H. TAYLOR.

THE WOODEN HOUSE FROM NORWAY.

SIR,—Some years ago I read a most interesting account of a house built by a gentleman somewhere in the western counties, which had been bodily imported from Norway; I ought, perhaps, to say that it had been bodily put together in that country, then taken to pieces in order to be packed and shipped, and again rebuilt when it arrived at its destination. The only material used in the construction was timber. Notwithstanding the great extra outlay involved in so many preliminary arrangements, the expense was said to be far less than an architect's estimate for an ordinarily built house, whilst the result, as regarded appearance, warmth, comfort, and probable durability, was pronounced most satisfactory.

Will any of your readers kindly tell me where I can apply to learn the result of time on the building, where a similar building can be obtained, and also whether the plan would be likely to succeed in building labourers' cottages, where it is desirable to keep the expense as low as is reasonably possible? S. M. P.

THE UTILISATION OF THE ROYAL ALBERT HALL.

SOME of our readers may be glad to hear that endeavours are being made to increase the usefulness of the Albert Hall. On the 18th inst., in the interval between the second and third parts of the "Creation" (admirably performed, under the direction of Mr. Barnby), a member of the council (Mr. George Godwin), in accordance with previous arrangement, addressed an inquiry to the audience from under a small suspended sounding-board. The speaker said the capabilities of the Hall for the transmission of musical sounds were admitted; the brilliant audience of that night, and the applause given to the singers, were sufficient attestation of that fact. But the body of gentlemen who had erected the building had always desired something more than that. The illustrious Prince who had long been mourned,—Albert the Good,—had contemplated that, around the adjacent gardens, a number of public buildings would arise consecrated to the development of the arts, science, and literature of the country, and it was with that idea in view that the Albert Hall had been built. Some difficulty as to single speakers had been found; but it had occurred to him that such a sounding-board as had been set up in St. Paul's Cathedral might have a good effect. With the friendly assistance of Mr. Penrose, the architect of the Dean and Chapter, this had been obtained, and the question he had to ask them was,—had these words been fairly heard in all parts of the building? A hearty response in the affirmative followed, and the speaker added that, the experiment being successful, the council would seek to persuade some distinguished men of science to deliver lectures in the Hall forthwith, and that they hoped to receive the cordial assistance of the public in their endeavours still further to utilise the building. It seems from accounts since received that the remarks were distinctly heard in all parts of the Hall; but that in certain lines there was an echo. There must have been about 6,000 persons present.

"ONE-HANDED BRICKLAYERS."

SIR,—I am very sorry to have to take my pen again to defend that trade by which for now twenty-three years I have earned my daily bread. A more malignant slur was never hurled against bricklayers than that quoted in your journal from the *American Architect*. I do not say against union bricklayers, for it is directed against union and non-union men alike, as it speaks of what bricklayers do at home, and non-union men have homes as well as unionists. But why are we designated "one-handed bricklayers," and why should we have one hand amputated? Does the gentleman, the author of this libel, wish us to put the mortar on the wall with a shovel, and then catch the bricks out of a barge, and throw them on the wall? But I will not profess to be in ignorance of his meaning. He means to say that when walls are more than 14 in. thick, the middle of the wall should be filled in with both hands. Perhaps the writer in the American paper is an architect for such buildings in America as are put up around the outskirts of London. I ask all reasonable architects if that is bricklaying proper? Let a clerk of works in London catch you putting them in with both hands, and what does he say? "Pull them out: we don't want any scamping here." But why is it scamping? I will explain. Wherever the wall is filled in with both hands, there is no regard for internal bond; and, as my friend John Woodley would say, every course that is laid covers the imperfections of the one beneath it. If the gentleman had seen what I have seen on large works, such as railways and docks (the former of which I fear for when they begin to decay a little), he would never advocate laying bricks with both hands; and, beside all this, I emphatically declare that it is untrue that the union forbids its members to work with both hands; and, sir, you know that I am in a position to know whether such rule exists or not. More than that, I send you a copy of the rules of both the London and the Manchester societies, the only two bricklayers' societies in England, and there you will see that what I state is correct. But why are bricklayers singled out as being such a besotted brutal set? I read a great deal, and I hear a great deal; but I am as yet unaware that bricklayers use their boots for the base purpose that is imputed to them by the newspaper over the water. Perhaps the writer left England twenty years ago. If he came back now, he would see that bricklayers are not what they were socially twenty years ago; if they were, it would not redound much to the credit of those who are straining every nerve to improve them educationally and socially. If the writer is an architect, are all architects entirely pure-minded? Do they always conduct themselves in proportion to the intelligence they possess? Again, do they use a ruling-pen with both hands? I am glad that it did not emanate from English architects. The manner in which they have deported themselves to us shows us that they would not stoop to such slander; but, on the contrary, are doing their utmost to give us a helping hand forward, for which every bricklayer in London is grateful.

JOHN P. MORRIS.

*** We have received a number of other letters to the same effect, including one from the "Teacher of the Bricklayers' Technical Education Class."

PROTECTION OF WIRE BRIDGES.

SIR,—Looking at that very handsome bridge at Chelsea (the Albert), I was struck with the necessity for a top covering for each of the wire ropes. The vibration cracks the paint, and then the wet finds a ready way in among the wires. Any covering had best be removable, and might be made ornamental. Z.

LIGHTHOUSES.

SIR,—The erection and maintenance of lighthouses on the coast of England and Wales was, in ancient times, a part of the prerogatives of the Crown, and the king exercised the power of granting "*concessions*" — to use a modern phrase—to build lighthouses, and charge tolls on all passing shipping. Under such conditions was erected, amongst others, the original Eddystone, and "The Smalls," in the Bristol Channel.

This power appears to have been thus exercised up to the time of Elizabeth, whereby a statute 8 Eliz., c. 13,* "the Corporation of the Trinity House are empowered to set up any beacons or sea-marks wherever they shall think them necessary, and if the owner of the land or any other person shall destroy them, or shall take down any steeple, tree, or other known sea-mark, he shall forfeit 100*l*., or in the case of inability to pay it, shall be *ipso facto* outlawed." This statute is therefore the authority, granted by Parliament, under which the Elder Brethren act; but their powers were very considerably modified by the Merchant Shipping Act, 1853. This Act provides,—"1. The light dues of the United Kingdom are to form *one imperial fund*, under the control of the Board of Trade. 2. From this fund all expenses of erecting and maintaining the lights of the United Kingdom are to be defrayed. 3. The three Boards which manage the lighthouses in England (Trinity Board), Scotland (the Commissioners of Northern Lights), and Ireland (the Ballast Board), are to render an account of their expenditure to the Board of Trade. 4. The Trinity Board is to exercise a certain control over the Boards in Scotland and Ireland, and is to judge of all their proposals to erect new lights, or to change existing ones, but in every case the sanction of the Board of Trade must *precede* the acts of *each* of the three Boards." The Board of Trade is therefore responsible in the last resort for the objectionable proceedings to which you call attention, and, on the assembling of Parliament, will doubtless be called upon to answer for their misdeeds.

E. GRIMES.

* See Blackstone's "Commentaries."

OPEN SPACES IN ST. PANCRAS.

IT will be remembered that in the session of 1875, after a violent opposition, the Vestry of St. Pancras succeeded in obtaining an Act of Parliament which enabled them to rescue from the encroachments of the Midland Railway Company the two large spaces, comprising together an area of about nine acres, known as the disused burial-grounds of Old St. Pancras and St. Giles-in-the-fields, situate on the eastern side of the Pancras-road, with powers to lay them out as an ornamental garden and recreation ground for the public in perpetuity. The delay that has occurred in carrying out the plans has been, to a great extent, in consequence of negotiations which have taken place between a committee of the vestry and Mr. Albert Grant, who, it had been intimated, was, as in the case of Leicester-square, so desirous of benefiting the public that he was willing at his own cost to purchase the whole line of old and dilapidated houses, known as Cook's and Eve's terraces, and effect their removal, the result of which would be to open up the two grounds to the main road, thus giving them a fine frontage, and an area very little less than that of Kennington Park. Some drawings have been made and plans prepared, and have been laid before Mr. Grant, who has the matter still under consideration. In the meantime, however, the vestry have determined to take energetic action, so that under any circumstances the acquired space shall be available for the use of the public in the ensuing spring. A sum of 3,000*l*. has been voted for laying out and planting the grounds in a manner which, whilst it will in no way interfere with the sanctity of the dead, will, on the other hand, exhibit the monument to Sir John Soane and other prominent specimens of the sculptor's art to the best advantage. The general supervision of the work has been entrusted to Mr. W. B. Scott, C.E., chief surveyor, whilst the laying out and landscape gardening department is to be carried out from designs prepared by Mr. William Dunford, superintendent of the St. Pancras Cemetery at Finchley, who will have the supervision, in conjunction with Mr. Gibb, the vestry clerk, of the horticultural and floral arrangements.

"TOBIN'S SYSTEM OF VENTILATION."

SIR,—If this system consists of the admission of fresh air into a horizontal air-flue, and the transmitting the same into different parts of an apartment, or into different apartments, by means of smaller vertical flues above head-level in these apartments, I may state this system has been in use in Durham County Gaol ever since the year 1844, and used in every addition made since that date. The following cells were added:—In 1844, 117 cells; 1849, 48 cells; 1850, 80 cells; 1857, 124 cells; 1863, 54 cells; 1866, 116 cells; 1873, 167 cells; or 751 cells in all. Cells are situated on the ground floor, first floor, second floor, and third floor, over each other, yet all receive their fresh air from the one large fresh-air flue under the ground floor.

WILLIAM CROZIER,
Engineer and Architect for County of Durham.

CHURCH-BUILDING NEWS.

Beamish.—The Bishop of Durham has consecrated St. Andrew's Church and Burial-ground at Stanley, which is part of the newly-formed parish of Beamish. The total cost of the church is about 4,500*l*. The building, which has been erected from plans prepared by Mr. J. C. Holt, architect, Manchester, consists of a nave and aisle. All the details of the building are of the Geometrical Decorated style. The length of the building is 96 ft., the width is 45 ft., and from the floor to the ridge of the roof is 40 ft. The nave is separated from the aisle by an arcade of five arches, supported on moulded pillars, and an elaborately moulded timber arch, resting on stone shafts, marks off the eastern portion of the nave for a chancel. A belfry turret rises to a height of 60 ft. at the west end of the chancel from between the nave and the aisle roofs. The church is fitted with open benches, providing accommodation for 400 people. The pulpit is of Painswick stone, inlaid with bands of marble, and is the work of Mr. G. Hope, of Burnopfield. All the windows are of large size, and are the work of Messrs. Wailes & Strang, of Newcastle.

Burlingham St. Andrew's (Norfolk).—The parish church of Burlingham St. Andrew's was re-opened by the Bishop of Norwich on the 4th inst., after restoration, the cost of which has been largely borne by Mrs. Burroughes, of Burlingham Hall. The nave of the church has a fine hammer-beam roof, with angels holding shields and emblems at the ends of the beams. This roof was in a very fair state of repair, and required but little doing to it; but the roof to the north aisle, of good plain moulded oak, was in a less fortunate condition, and had to be entirely taken out, and has been carefully restored in accordance with its original form, and re-covered with lead. The windows throughout, which are all of a Late Perpendicular character, have been made good where defective, and glazed with rough plate cathedral glass. The old high pews and brick flooring have been taken away, and new flooring of wood and massive oak benching placed in their stead. We hear that a very fine and interesting old screen which was in the church has been most religiously preserved,—on the panels there are several uncommon figures of saints, which have been refixed untouched. The principal portion of the

works has been executed by Messrs. Evans & Durrant, of South Walsham. Messrs. Cornish & Gaymer restored the screen, and Mr. Groom, of Ipswich, carved the bench-ends, pulpit, and prayer-desk. The whole of the works were carried out under the direction of Mr. Phipson, architect.

Tividale.—On the 8th inst. the corner-stone of St. Michael's Church, Tividale, near Dudley, was laid. The estimated cost of the church is 8,000*l.*, towards which Lord Dudley contributes 3,000*l.*, and erects the tower. The edifice will accommodate 800 people. Messrs. Davis & Middleton are the architects, and Mr. John Everal, Malvern, is the builder.

Farnham.—The Sumner Memorial Church, Farnham, was consecrated on the 9th inst. The new edifice is built on land given by Mrs. Lloyd, of Cheltenham, a native and formerly a resident of Farnham, and has been erected by the liberal contributions of the inhabitants of the town of Farnham and the diocese of Winchester, over which the prelate to whose memory it is erected, presided for nearly half a century. The church is dedicated to St. James, and was originally designed to consist of a chancel and nave, with north and south aisles, a tower 90 ft. high at the west end of the south aisle, a vestry, organ-chamber, and choir-passage leading to the nave on the north side of the chancel, and a transeptal aisle for children's sittings on the south side. The funds at the disposal of the building committee not being sufficient to carry out the entire plan, the north aisle has been omitted, and the tower postponed. The church is Early English in style, and the walls are faced with black iron-stone from the neighbourhood, with Bath stone dressings. The roofs are covered with tiles. There is a lofty clearstory lighted with lancet windows, the interspaces being filled with roundels, having carved monograms and crosses, the gift of the architect. The east window is a triplet, and the west window has four lights enclosed under one hood moulding. In the interior, the south nave aisle is divided from the nave by an arcade of five arches, the columns being circular, and the arches having square soffits. The architect is Mr. H. Woodyer, of Graffham, and the work has been executed by Messrs. Goddard & Son, Farnham.

Weston-under-Lyziard.—The old parish church of Weston-under-Lyziard, Staffordshire, was re-opened on the 4th inst. by the Bishop of Lichfield, after restoration and enlargement, which have been carried out after designs from Mr. Ewan Christian, of London, by Messrs. Bowdler & Darlington, of Shrewsbury, at the expense of the Earl of Bradford. The principal features of the restoration of the church have been the opening out of the chancel, the lowering of an unusually lofty pulpit, the removal of an unsightly gallery from the west end, the entire reseating of the nave, the removal of a flat ceiling of plaster, and the substitution of a ceiling in panelling of pine, stained and varnished, and the opening of the tower to the body of the church. Added to this, two transepts have been built, opening each by two arches from the chancel. That on the south side is intended for the use of the Earl of Bradford's family and guests, while that on the north contains seats for school children.

Gunley.—The parish church of St. Helen, Gunley, in Leicestershire, has been restored recently, and it was re-opened on New Year's-day. The spire has been restored to the Perpendicular, and the chancel has been rebuilt. The works have been carried out under the care of Messrs. Bodley & Garner, of London.

Castle-Acre.—The parish church of Castle-Acre, Norfolk, was re-opened on the 4th inst., after restoration. No one who has passed through the village of Castle-Acre by the Swaffham road can have failed to be struck with the stately outline of the old grey flint church, which faces the traveller for two miles of his way, standing just clear of the old Roman earthworks which mark the western limit of the somewhat desolate though striking and picturesque old village. Of late years the interior had fallen into a state of dilapidation. The church, which is dedicated to St. James, dates from the commencement of the fourteenth century, but the present structure, which consists of a nave, chancel, north and south aisles, and square embattled tower, is of the Early Perpendicular style. To the adjoining Cluniac priory the church is probably indebted for some curious relics, among which the most worthy of note are the lofty font-cover, of the type of which there is an example to be seen in Ball church, and a very remarkable pulpit, bearing on four sides the painted effigies of four doctors of the church, and supported by a single shaft, the effect of which is unfortunately, though not irremediably, lost by the present position of the pulpit. The ancient rood-screen, too, of which the lower part still remains, contains some curious painting. The chancel has been restored by the munificence of the Earl of Leicester.

Kilburn.—The new church of St. Luke, Kilburn Park, was consecrated on the 9th inst. It has been completed at a total cost of 4,500*l.*, and contains 800 free sittings. It is situated in the new parish of St. John, Kensal-green, and stands midway between that district and those of Kilburn and Willesden. The building, which is 107 ft. long, 57 ft. wide, and 54 ft. high to the apex of the nave roof, is Early English in character, and consists of a nave and chancel with side aisles. The materials used are what is technically known as "London stocks," relieved by red brick bands and arches, stone being sparingly used for constructional purposes only. Mr. John T. Lee was the architect, and Messrs. Dove Brothers were the builders.

Talyllyn.—The little parish church of Talyllyn, Merionethshire, has lately been restored. The work has been carried out under the direction of Mr. Henry Kennedy, architect. The church consists of a nave, with a chancel under a continuous roof, the demarcation between the nave and the chancel being effected by the more ornamental timbering of the roof, and a massive cross-piece of old oak at their intersection. The internal fittings, including the pulpit, prayer-desk, stalls, and open seats, are of pitch-pine, varnished. The church will accommodate 200 persons. The cost of the work has been about 450*l.*

Tendring.—Considerable alterations and improvements have recently been effected in the parish church of Tendring, Essex. These include the erection of a new tower and spire, given by Mr. J. Cardinall, lord of the manor. A reredos is now being erected, and open benches have been substituted for the pews.

Sheffield.—Sir Gilbert Scott has lately visited Sheffield, for the purpose of inspecting the parish church, with a view to its restoration. Sir Gilbert is said to have expressed himself confident that the edifice could be made worthy of the commanding position it occupied in the centre of the town. He also stated that the beauties of the church were of no ordinary character. The cost of making the necessary alterations is to be borne by Mrs. Thornhill-Gell, of Stanton-in-the-Peak, Derbyshire, whose munificent contribution of 10,000*l.* has been already lodged in the bank.

Bournemouth.—The chancel of the new church of St. Swithin, on the east cliff, was consecrated on the 23rd ult., by the Bishop of Winchester. It is made available for congregational worship during the progress of the construction of the nave. There is a reredos, given by Lady Eden, the central subject of which is the "Crucifixion." The chancel has neat stalls for the choir and an eagle lectern; and a suitable organ-chamber has been built also.

DISSENTING CHURCH BUILDING NEWS.

Wolverhampton. — Snowhill Congregational Church, Wolverhampton, was reopened on the 14th inst., after alterations and repairs. The church has been thoroughly renovated throughout, at a cost of over 1,200*l.* The work has been done under the superintendence of Mr. Fleeming, architect. The lowest estimates for the work were accepted as follows:—Builders' and carpenters', Mr. Clarke; painters' and decorators', Messrs. Taylor & Parker, Birmingham; organ improvements, Mr. Dresser, Walsall; warming apparatus, Messrs. R. L. Jones & Son.

Norwood.—A new Baptist chapel is in course of erection in Chatsworth-road, Lower Norwood. The style adopted is Gothic, and the chapel is arranged to seat 650 persons on the ground-floor, and provision is made for galleries, when needed, to seat 350 more. The builders are Messrs. Newman & Mann, and the architects, Messrs. Power & Wheeler.

Pontefract.—The Congregational chapel at Pontefract having been closed for many weeks past, for extensive alterations, improvements, and the erection of a new organ, was reopened on the 1st inst. The interior of the chapel has undergone a thorough transformation, by the removal of the pew or box system from the body of the chapel. The new organ has been erected by Messrs. Brindley & Foster, of Sheffield, at a cost of about 400*l.*

Southport.—A new Wesleyan school-chapel has been opened in Southbank-road, Southport. The building consists of chapel, 50 ft. by 30 ft., with minister's vestry and class-room, each 13 ft. by 10 ft. 6 in., and infants' class-room and tea-room, 22 ft. by 8 ft., with separate conveniences for minister, boys, and girls, in the rear. The walls are of red pressed Bolton bricks, with Cefn stone dressings to doors, windows, bell-turret, gables, buttresses, &c.; and the style adopted is Geometrical Gothic. The total cost was 1,550*l.* The architects are Messrs. Maxwell & Tuke, of Southport; Mr. Thomas Bridge, of Burscough, being the builder.

BOARD SCHOOL, KEYMER, SUSSEX.

THE second school erected by the Keymer School Board has been opened. It is 68 ft. from the road. Its total length is 99 ft. It has a southern frontage, and is approached by a lobby, 18 ft. by 8 ft., situated in the centre of the building. On the west and east side of the lobby are a school-room and a class-room, and on the west side of the playground is a covered playground for infants. The dimensions of the school-rooms are each 39 ft. by 18 ft., and the class-rooms 18 ft. by 14 ft. The class-rooms are placed at the extreme end, and project towards the south. The west side of the school is to be devoted to the education of infants, while in the other side a mixed school will be held. Connected with the lobby are the lavatories, the dry-earth system being adopted. The school is of the simple Italian style of architecture, and was designed by Mr. G. A. Burn, London. It is built of red brick, faced with cement, and roofed with ornamental red tiles. The windows are fitted with Eyre's patent fasteners, which cause the windows to open easily, and dispense with cords. The roof is partly an open one, being ceiled at the collar. The infants' part of the school is laid with solid blocks of wood, placed on a concrete floor. The mixed school has the usual deal plank flooring. The whole of the building is warmed by Bacon's high-pressure hot-water apparatus, and special provision has been made for keeping the children's clothes—which are hung in the lobby—aired, a hot-water pipe having been placed in it. The school will accommodate more than 200 scholars, and has been erected at a total cost of 3,443*l.*, which has been expended in the following way:—Builder's tender, 2,235*l.*; furniture and fittings, 167*l.*; law, architectural charges, &c., 138*l.*; balance of extra work, legal and obtaining loan, 192*l.* 7*s.*; cost of site, 710*l.* 13*s.* Mr. Simeon Norman was the builder, and Mr. R. W. Hobden was clerk of the works. The cost per head, 15*l.*, would seem large, but we are informed that it includes preparation of site (and part foundation) for all future buildings, and also all playgrounds which will hereafter be required, and boundary-walls all round the site.

Books Received.

Life of a Scotch Naturalist—Thomas Edward, Associate of the Linnæan Society. By SAMUEL SMILES. London: John Murray.

WE notice this, the latest of those biographies of self-made men for which we are indebted to Mr. Smiles, as affording an example of what can be accomplished by force of will acting on a naturally strong bent in favour of special pursuit, in spite of what might seem almost insurmountable obstacles. Mr. Thomas Edward is (for he is still living) the son of a private in the Fifeshire militia, but was born at Gosport, whence, however his parents soon removed to Aberdeen. For no accountable reason, he seems almost from his cradle to have been possessed by an unconquerable love of animals of every sort, of their ways and doings, and an equally unconquerable desire to possess, in one way or another, every sort of animal he saw. He was a terror at home, and a wonder to his school-fellows, for his constant importation of animal curiosities, dead and living, into the house, and for his profound knowledge of birds and their nests, and the impossibility of persuading him that it was time to return home, when once out on a bird-catching or bird-nesting excursion. So far the story of a boy with a mania which renders him notorious and not a little troublesome, is not so uncommon. But the unrelenting energy with which his favourite study was pursued throughout his life is most remarkable. He

was by trade a shoemaker, having a wife and family to keep on the proceeds of his trade, which cannot have been large, as it appears he worked as assistant, and not on his own account. Yet he managed to collect a museum of the Banffshire *fauna*, such as astonished visitors competent to judge of the time and labour necessary to make such a collection single-handed. His employer appears to have favoured his pursuits as much as possible, and Edward would work through the night, satisfying himself with an hour or two of sleep, to gain time for a naturalising excursion the next day. When out upon such an excursion, he seems to have been utterly indifferent to cold, hunger, fatigue, or the lapse of time, or even to serious injury in climbing up and down cliffs, so long as he got the object of his search. His own account of some of his chases after rare birds, when he appears sometimes to have expended two days in the pursuit, remaining out all night to catch the birds when they first stirred in the morning, and the rough work he went through on some occasions, furnishes an extraordinary instance of zeal and perseverance; proving also, at the same time, that he must be possessed of a very strong constitution not to have killed himself long ago. But he had more serious obstacles to encounter, in the form of poverty and want of appreciation; for his biography illustrates even more pointedly than usual the truth that no man is a prophet in his own country; and his museum, of which Aberdeen ought to have been proud, attracted scarcely any notice, and eventually had to be sold for far below its value, and is, it is believed, entirely broken up and dispersed now. Mr. Edward, who seems to have preserved throughout all his difficulties a strong and stern self-respect, took no steps to bring himself favourably before the world; the idea that he should write about and publish any of his discoveries seemed to have been quite a new one to him, when it was suggested and urged upon him by some appreciating *savans* who ultimately came to know what he had done, and how valuable his labours had been towards the elucidation of many points in natural history; especially as regards the habits of animals in their native haunts, with which he was more familiar, as may be supposed, than any one could be who did not go and live among them as he may almost be said to have done. Having been persuaded that his knowledge would be of value to the scientific world, however, he exerted himself to overcome his defects of education in order to commit to writing some of his observations; but much even of what was written was used by his family for "kindling" (*i.e.*, lighting fires), with no care on his part to prevent this destruction. But, as his biographer observes, he is one of those who have lived *for* science, not *by* science; and his love of nature appears to have been its own end and its own reward. Late in life he received due recognition from the Linnæan Society and from educated people who understood and valued him. But he might well feel aggrieved in thinking of how much more he might have accomplished. "I know," he said, "what I have done, and from that I can conceive how much more I might have done if I could have got a little help. Think yourself—only think—of a poor illiterate working man struggling against every sort of privation for so many years, with no other object in view but simply to gain a little knowledge of the works of creation—and say if I can be blamed because I occasionally grieve that I had no help, when it would have enabled me to do so much more than I have already done. . . . All my honours have come from a distance. I have kept the Museum of the Banff Institution for about twenty-one years, for, I may say, almost nothing; and though the Linnæan Society thought me worthy of being elected an associate, the people here did not think me worthy of being an honorary member of their society." His wife's opinion as to his pursuits is characteristic: "Weel, he took such an interest in beastis, that I didna compleen. Shoemakers were then a very drucken set, but his beastis keepit him frae them." In which there certainly is a moral, of pretty wide application.

It is pleasant to add that the illustrations to the book, consisting of engravings by Whymper and Cooper, with an admirable portrait-etching by Rajon as frontispiece, are above the usual mark of book illustrations, and that the author was enabled to make this addition through the liberality of a gentleman (Mr. Reid), who became interested in the subject of the biography, and expressed a wish to illustrate it at his own cost. It should be noted also that her Majesty, on the perusal of Mr. Smiles's book, testified her recognition of the value of Mr. Edward's labours by conferring a pension upon him. As to the suitability of writing the biography of a man who is yet living, Mr. Smiles observes that, had the book not been written now, it probably never could have been written. To the question, "Is the life really worth writing?" he leaves the public to answer. We think no one who reads the life of Thomas Edward will have the slightest doubt on that point.

Miscellanea.

"A Combat with an Infective Atmosphere."—The usual "before Easter" series of Friday evening discourses at the Royal Institution was commenced on the 19th inst. by Professor Tyndall, F.R.S. His subject was a continuation of that he brought before the members last year. He then, at the commencement of that discourse, described the methods he adopted for testing whether organic infusions gave birth to low forms of life, bacteria, vibriones, &c., when exposed to "optically" pure air only, such as Dr. Bastian and other experimenters met with in the experiments conducted in accordance with their arrangements. Certain methods were resorted to last year for letting the air purify itself in closed chambers, and fifty or sixty various infusions were experimented upon. These infusions were found last year to be reduced to utter sterility by boiling in an oil-bath for five minutes. Every germ was destroyed. In last September Dr. Tyndall resumed his experiments, but the results were not the same as before; and in October he tried some solutions of fungi, which were boiled for three hours, and even more. Yet, nevertheless, these also gave way. Many subsequent lots were tried with increasing care, but bactarian life was more or less developed, and in November he began to suspect he was working in an infective atmosphere. Instead, therefore, of continuing to operate in the laboratory at the base of the institution, the experiments were made in the upper part of the building, and exceeding care taken to filter the solutions. New apparatus was constructed and further experiments made, the ultimate result being that at last there were many cases in which the infusions remained clear and good, and many in which organic life was germinated, and putrescence followed. Even the calcining of the inclosed air by the platinum coil and voltaic currents failed to destroy the atmospheric germs, as it had not in the previous year, and consequently Dr. Tyndall's scientific acumen was directed to the elucidation of the cause. The result has been that instead of coinciding at all with the theories for spontaneous generation, he has shown that by the use of well-devised apparatus the results of perfect preservation can be attained by the perfect exclusion of the air. The apparatus of Dr. Roberts, of Manchester, was highly praised.

The Carlisle City Surveyorship.—At a special meeting of the Carlisle Town Council on the 15th inst., a resolution passed at a previous meeting of the Council rejecting the recommendation of the committee that Mr. McKie be appointed surveyor and directing that a surveyor be advertised for at a salary of 400*l.* per annum, the person appointed to devote his whole time to the duties of the office, was rescinded by twenty to fifteen; and the following resolution was carred by thirty to fourteen:—"That Mr. Hugh Unsworth McKie be and he is hereby appointed surveyor for the city of Carlisle, at a salary of 400*l.* per annum, and on the following conditions, viz., that he shall, in the first place, devote to the duties of the office so much of his time as shall be necessary, or shall be required by the Corporation, and shall not take any private practice in matters which come under the control and jurisdiction of the Corporation or Urban Sanitary Authority." Amendments to the effect that the surveyor should devote the whole of his time to the duties of his office were lost.

Bricklayers.—We are asked to mention that a meeting will be held on Tuesday evening, Jan. 30, at eight o'clock, at the Working Men's College, 91, Blackfriars-road, with a view to commence another class for the Technical Education of Bricklayers. Mr. J. P. Morris has been appointed instructor. His employer, Mr. J. T. Chappell, builder, has made the class a present of the necessary tools and materials to commence with.

Result of not Stamping a Contract.—Mr. George Kidd, builder, of Ogleforth, York, brought an action in the York County Court on the 9th inst., against Mr. J. Duncanson, of Yearsley Bridge, York, for 18*l.*, balance of account for work done and materials supplied in building a house in Huntington-road. Plaintiff sent a tender to defendant in which he offered to construct the house for 318*l.* The tender was accepted in July, 1874, and the house was completed within a year. Defendant paid various sums on account until a balance of 18*l.* only remained, and when pressed for that sum he declined to pay, alleging that the work was badly done. The specification and tender were produced, but they were unstamped. After a brief discussion, the Judge ruled that the tender must be stamped, and told Mr. Blackburn that his client must pay the penalty, 11*l.* 1*s.* 6*d.*, before proceeding further. Plaintiff, however, elected to be non-suited.

Corrosion of Iron.—Zinc Paint.—We understand that arrangements have been made with Professor Barff to read a paper at the Society of Arts on Wednesday, the 14th of February, on the subject of his recent discovery of a method of preventing the corrosion of iron by a process of oxidation. We trust he will have an audience of sufficiently practical and scientific men to determine absolutely the value of this invention, which, if successful, must undoubtedly give a most beneficial impetus to the whole of the iron industries of this country. Professor Barff will at the same time read a paper on the manufacture of zinc white paint, the patented process of Mr. Griffiths, of Liverpool. This paint is said to possess all the virtues of white lead, and to have the advantage not possessed by white lead, of not being affected by sulphuretted hydrogen, which blackens white-lead paint, and, moreover, the further advantage of not being injurious to the workmen manufacturing or using it.

Free Public Libraries of St. Margaret and St. John the Evangelist, Westminster. The Commissioners meet on the first Wednesday in each month, at the Chief Library. The Chief Library and Reading-room are 23, Great Smith-street, and the Branch Library and Reading-room, 3, Trevor-square, Knightsbridge; these are open daily, from 9 a.m. to 1 p.m., and from 5 p.m. to 9 p.m., excepting Sundays, Good Friday, Christmas Day, and the Bank Holidays. The annual report, just now published, states that in the Chief Library the number of volumes is 10,212. During the past year 86,786 volumes were issued to borrowers for home reading and to readers in the Reference Department. The number of persons who have made use of the reading-room during the year is 111,913. At the Branch Library, 6,240 volumes were issued during the year; and the visitors to the reading-room numbered 13,490.

Snodland Working Men's Club.—A new working-men's club at Snodland has just been opened. Mr. William Lee, of Holborough, generously undertook to erect a building suitable for a club-house, and he has caused to be erected in the Holborough-road a house adapted to the purposes to which it is to be devoted. The structure and its furniture entailed an outlay of about 2,000*l.* The building was erected by Messrs. Burgess & Langridge, of Snodland, from plans prepared by Mr. H. Raven. It contains a large hall capable of accommodating several hundred persons, in addition to several smaller rooms for recreation and other purposes, the steward's quarters, &c.

Trees for London Streets.—According to the experience of Mr. W. Paul, nurseryman, there are four trees which thrive better than others in towns; these are the plane (*platanus occidentalis*), the poplar (*populus monilifera*), the elm (*ulmus campestris*), and the gigantic stag's horn sumach (*ailanthus glandulosus*). The latter, though but little known, is a very beautiful tree, from the north of China, growing to the height of 50 ft., with large handsome pinnate leaves, which, on the young trees, are often a yard long. The lime (*tilla europæa*), when it will grow, is one of the best of town trees, because it may be pruned into any shape required without injury, and the flowers are very sweet.

The Birmingham Art Gallery.—The *Birmingham Gazette* states that the mystery which for six years has surrounded the name of the donor of 3,000*l.* in aid of an Art Gallery for Birmingham was disclosed on the 18th inst., at a meeting of the trustees of the Gallery Fund. That donor was the late Mr. Clarkson Oaler.

British Archæological Association.—At the fourth meeting of the session,—Mr. Thomas Morgan, F.S.A., in the chair,—Mr. R. Smith, F.S.A., reported that a large portion of the walls of Britford Church, Wilts, were those of a Roman building. The first paper of the evening was by Mr. W. F. Grover, C.E., on "The Suez Canal." After a warm eulogium upon the engineering genius of M. de Lesseps, which he considered had not been sufficiently recognised in England, the lecturer proceeded to describe the various efforts made in ancient times to form a communication from the Mediterranean on one side to the Red Sea on the other. The records of Herodotus, Strabo, and Pliny were passed in review, and the course of the ancient works traced from Bubastis to the Bitter Lakes, and thence to Assinoe at the head of the Red Sea. The second paper was by Mr. Syer Cuming, F.S.A. Scot., on "The Peculiar Stoneware Manufactured at Sieburg, near Cologne, at the latter end of the fifteenth and during the whole of the sixteenth century."

Ipswich Mechanics' Institution.—The Ipswich Mechanics' Institution was re-opened on the 15th inst., after being closed to allow of re-arrangement, including the erection of a new reading-room, which is in the Queen Anne style, according to plans prepared by Messrs. Barnes & Bishopp, architects. The contractor was Mr. Robert Girling, whose original contract was 692*l*. There have been, however, extras and additions, and the total expenditure will, it is expected, exceed 1,000*l*. The gas-lighting and the decorative painting have been carried out by Mr. B. Bird. Mr. E. Sporle was the sub-contractor for the plastering, both plain and ornamental. The whole of the works were carried out under the sole superintendence of Mr. Bishopp.

Emblematic Tombs.—As to emblematic tombs, an extraordinary example is that of Sir Thomas Parkyns, in the chancel of Bunny Church, Nottinghamshire. Sir Thomas had a great reputation in the Midland counties, as a wrestler, and the monument in question, erected in the middle of the last century, consists of a statue which represents him in the cap and dress of a wrestler, and in the attitude of wrestling with Death for an opponent. In the Brompton Cemetery the monument of a well-known Thames waterman exhibits his wherry and skulls. It is unnecessary to say that on the sepulchral slabs of the Middle Ages emblems of the calling of the persons commemorated are very general.

"Commission."—It is stated that the Admiralty have removed the names of a firm of engineers from the list of those invited from time to time to tender for engineering works to be executed for the Government, in consequence of a member of the firm having offered a sum of money to one of the dockyard officials with the view of obtaining his support in certain transactions in which the firm was concerned.

Institution of Surveyors.—The next meeting will be held on Monday evening, January 29th, when the adjourned discussion on the paper, read by Mr. W. T. Marriott at the last meeting, entitled "Riparian Rights," will be resumed. We have before us reports of this paper and of the discussion which followed, parts of which are especially interesting at this moment, but we are unable to find room for them, at any rate in our present number.

Sanitary Condition of the War Office.—Rumours have long been general regarding the sanitary condition of the War Office, and her Majesty has commanded a commission to inspect the premises, and report thereon. The commission consists of Sir William Jenner, M.D., Sir W. W. Muir, M.D., chief of the medical department of the army; Dr. Seaton, and Mr. Noel, M.P. It ought surely to have included an architect or engineer.

United States Patents.—There were no fewer than 22,408 applications at the United States Patent Office for grants of patents in the year ending the 30th of September, 1876, and the number issued in the year (including re-issues and designs) was 15,911, being 1,681 more than in the preceding year. There were also 1,029 trade-marks, and 499 labels, registered in the year 1875-76.

Rheims Cathedral.—The French Minister of Public Works has authorised an expenditure of 80,000*l*. upon the restoration of Rheims Cathedral. The cathedral is 457 ft. long by 100 ft. broad, the transepts having a total width of 165 ft. The height of the roof is 110 ft.

Obituary.—We are sorry to hear of the death of a correspondent who promised to be useful,—Mr. Arthur Forbes, son of the Rev. A. G. Forbes, formerly of Glasgow. He died at 19, Boston-terrace, Hammersmith, on the 17th inst., after a severe and prolonged illness.

London and South Western Railway Works.—We are asked to mention in reference to our notice of the London and South Western Railway Extension Works at Nine Elms and Waterloo, that Messrs. Perry & Co., of Bow, are the contractors for the whole of the extension works at Waterloo, including the new approaches, and for the new workshops, &c., at Nine Elms.

A Paradise for Infants.—The *Sanitary Record* states that in the village of Harbottle, Northumberland, no child has died during the last twenty years; a farmer and his three shepherds have between them forty-seven children, and during the past thirty years not a death has occurred in their families.

Metropolitan Improvements.—Mr. Edward Stanford has issued, as usual, a map showing proposed metropolitan railway bridges and miscellaneous improvements. It includes, of course, the sites proposed to be dealt with under the Artisans' and Labourers' Dwellings Act.

Ecclesiastical Dilapidations Acts.—The Ecclesiastical Surveyors' Association has issued a report on the proceedings of the Select Committee of the House of Commons on the Ecclesiastical Dilapidations Acts. We may give some quotations from it in our next.

Sir Walter Scott's House in Edinburgh. The house, No. 25, George-square, Edinburgh, which was occupied by Sir Walter Scott, has been sold by auction in Messrs. Lyon & Turnbull's rooms, George-street, for 2,725*l*., the upset price being 2,600*l*.

TENDERS

For the erection of dwelling-houses and shops, Stockwell-road. Mr. T. S. Archer, architect. Quantities not supplied:—

	General Works.	Shop Fronts.
Wagner	£3,897 0 0	£284 0 0
Edworthy	3,290 0 0	230 0 0
Brown	3,100 0 0	200 0 0

For alterations and additions to a residence, Seven Sisters'-road. Mr. T. S. Archer, architect:—

Allen & Son	£1,000 0 0

For the erection of the Ramsgate and St. Lawrence Royal Dispensary. Messrs. Hinds & Son, architects:—

Elgar	£870 0 0
Duckett	793 0 0
Osborne	764 0 0
Home	749 0 0
Goodman	745 0 0
Newby (accepted)	737 0 0
Cowell	718 0 0

Accepted for a new abattoir at Wakefield for the Borough Market Company. Mr. William Watson, architect:—

Tattersall (all except ironwork)	£775 10 0
Shillito & Harrison (ironwork)	450 0 0

Accepted for enlarging the Public Baths, Wakefield. Mr. William Watson, architect:—

Flower, Brothers	£331 0 0

Accepted for five houses at Carlton-gate, near Pontefract. Mr. Wm. Watson, architect:—

Jackson & Spencer (excavating, brick, and stone)	£1,350 0 0
Stewart (slating)	150 0 0
Eastwood (plastering)	195 10 0
Wright (carpenter, joiner, and painter)	767 18 0
Johnson (plumbing, glazing, and ironwork)	285 0 0

For brick sewers at Kensington:—

Hall	£2,842 14 0
Mears	2,530 0 0
Rolwey	2,510 9 0
Pizzey	2,400 0 0
Nowell & Robson	2,310 0 0
Royes	2,187 0 0
Self	2,108 0 0

For roads and pipe sewers at Ealing:—

Nowell & Robson	£2,410 0 0
Pizzey	1,939 0 0
Crockett	1,915 0 0

For alterations and additions to carriage factory for Messrs. Foster & Tofield. Mr. D. Haylock, architect. Quantities supplied:—

Ronald	£355 0 0
Tilly	320 0 0
Robinson	312 12 6
Hearn	296 10 0
Beale (accepted)	286 0 0

For erecting a new church at Beer, Devon, for the Hon. Mark Rolle. Messrs. Hayward & Son, architects:—

		Deduct.*
Moass & Redway	£6,590 0 0	£409 0 0
J. & J. Marshall	6,410 0 0	350 0 0
Kenshale	6,179 0 0	487 0 0
Parsons & Perriman	6,165 15 0	325 0 0
Stephens & Bastow (accepted)	6,079 0 0	493 0 0
Prescott	5,832 19 9	256 13 0

* If upper part of tower is omitted.

For covered vegetable market at Burslem. Mr. R. M. Richards, architect. Quantities by Messrs. Pollard & Showell:—

Contract No. 1 (Builders' Work).

Brindley	£14,640 0 0
Grosvenor	14,570 0 0
Dawson & Bradney	14,016 0 0
H. & R. Inskip (accepted)	13,999 0 0

Contract No. 2 (Iron Roof).

Berrisford Engineering Co.	£2,355 0 0
J. & A. Glover	2,111 10 0
Silvester	1,996 17 6
Dixon	1,979 0 0
Handyside & Co.	1,939 0 0
R. & J. Rankin	1,880 0 0
Bridge and Roofing Co.	1,709 0 0
Jukes, Coulson, Stokes, & Co.	1,658 0 0
Dawney	1,615 0 0
Hill & Smith (accepted)	1,350 0 0

For the erection of a school to provide accommodation for 500 children on the site in Marlborough-road, Chelsea, for the School Board for London. Mr. E. R. Robson, architect:—

Rankin	£7,043 0 0
Scrivener & White	6,382 0 0
Pritchard	6,335 0 0
Brass	6,099 0 0
Hook & Oldrey	6,013 0 0
Wall, Brothers	5,989 0 0
Downs	5,979 0 0
Stimpson & Co.	5,970 0 0
Tongue*	5,802 0 0

* Recommended by Works Committee for acceptance, but referred back for further consideration.

For proposed church at Purley, near Croydon. Mr. James Fowler, architect. Quantities by Mr. J. Glenn:—

Pattinson	£6,088 0 0
Goddard & Son	6,049 0 0
Downs & Co.	6,005 0 0
Bennett	5,837 0 0
Staines & Son	5,644 0 0
Hide & Co.	5,550 0 0
Cornish & Gaymer	5,214 0 0
Longley	5,118 0 0

For the erection of No. 6, Warehouses, Carter-lane, City:—

Dove, Brothers	£15,575 0 0
Scrivener & White	15,217 0 0
Browne & Robinson	15,063 0 0
Morter	14,936 0 0
Brass	14,859 0 0
Hart	14,767 0 0
Crabb (accepted)	14,462 0 0
Newman & Mann	13,651 0 0
Sharman	13,000 0 0

For alterations and additions to the Public Baths and Wash-houses, Greenwich. Mr. Henry Roberts, architect. Quantities supplied:—

Linfield	£2,413 0 0
Battley	2,300 0 0
Prebble & Co.	2,290 0 0
Nightingale	2,264 0 0
Sharman	2,250 0 0
M'Cormick	2,150 0 0
Beale	2,130 0 0
Le Fevre & Co.	1,850 0 0
Bridel (accepted)	1,850 0 0

For cast-iron tank and fittings, &c., for the Public Baths and Wash-houses, Greenwich. Mr. Henry Roberts, architect. Quantities supplied:—

Rennie & Co.	£1,086 0 0!
Newton, Chambers, & Co.	1,034 0 0
Abbot & Co.	850 0 0
Head, Wrightson, & Co.	850 0 0
Sheppard	809 10 0
Nightingale	800 0 0
Mason	736 0 0
Stacey, Davis, & Co.	711 0 0
Jukes, Coulson, Stokes, & Co.	699 10 0
Brettell	696 18 6
Le Fevre & Co.	696 0 0
Gardiner	649 10 0
Merryweather & Sons	642 0 0
Richards & Co.	619 7 2
Young & Co.	540 0 0
Garvie, jun., & Co. (accepted)	523 0 0!

For shoddy-walling, rubble-walling, and cinder-walling at the Cemetery, Burslem, for the Burslem Burial Board. Mr. E. W. Richards, architect:—

Prices per yard run for finished wall 7 ft. high.

	Shoddy.	Rubble.	Cinder.
Tyler	£3 19 6	£2 15 0	£2 18 0
Baggaley	3 0 0	2 10 0	1 15 0
Mountford	2 13 0	2 10 0	—
Gouldstraw (accepted)	1 17 0	1 13 0	—
Horton (accepted)	—	—	0 15 0

For rebuilding the Crown and Cushion Tavern, London-wall, for Messrs. Chapman & Brothers. Mr. Thomas Chatfeild Clarke, architect. Quantities supplied by Messrs. Hovenden, Heath, & Berridge:—

Colls & Sons	£7,870 0 0
Bracher	7,770 0 0
Clarke & Bracey	7,760 0 0
Killby	7,673 0 0
Coleman	7,599 0 0
Browne & Robinson	7,510 0 0
Ashby & Horner	7,447 0 0
Newman & Mann	7,357 0 0
Pritchard	7,334 0 0
Brass	7,240 0 0
Wagner	6,735 0 0

For building granaries at Mill Wharf, Mill-street, Dock head, for Messrs. Vogan, Brothers. Messrs. Whitmore & Kennard, architects. Quantities supplied:—

Brown	£3,273 0 0
Rivett	3,196 0 0
Wood	3,183 0 0
Morter	3,117 0 0
Newman & Mann	3,060 0 0
Rider	3,038 0 0
Bangs	2,998 0 0
Cook & Green	2,993 0 0